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A hybrid of theory-based analysis and empirical enquiry, this dissertation seeks to investigate the perceptibility of Classical syntax, ultimately striving to bridge the knowledge gaps that have long existed between the fields of analysis and cognitive science. In particular, the study looks to address the following unknowns: 1) recognition of initial tonic; 2) recognition of tight-knit and loose thematic constructions; and 3) understanding of the contextual nature of cadence. The study centres on the reconstruction of Classical piano sonatas that have been segmented into puzzle pieces using form-functional and sonata theories, an approach that enables the application of syntactical and formal perspectives in an empirical setting, thus giving this study its novelty. The following were hypothesised: 1) sequential accuracy, the ability to process Classical syntax and level of formal training are linearly related; 2) functional recognition, however, is found in any individual familiar with Western musical style regardless of educational background; 3) understanding of Classical syntax is largely Mozartean.

The experiments were carried out virtually and were targeted at subjects that were representative of the spectrum of theoretical expertise. Results collected confirm the ability of subjects to organise formal functions, discern initial tonic given a random mix of harmonic shades, recognise the difference between tight-knit and loose themes and their significance, as well as the prevalence of Mozartean idiom in the cognitive faculty and the linear relationship between expertise and accuracy. Inasmuch as these findings strongly suggest that form-functional relationships are audible, the dissertation argues for the incorporation of both analysis and empirical science in music education, a combination that results in a richer understanding and deeper appreciation of musical processes.

Between *Formenlehre* and Cognition

A Puzzle-Based Investigation into the Perceptibility of Classical Syntax

by Laura Erel

A thesis submitted for the degree of Doctor of Philosophy

Department of Music

Durham University

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For having been so brave: well done, Laura.

Chapter 1: Introduction

*What lies deepest in the heart of man, in all that he does and in the manner of his thinking, is his striving to discover meaning, to escape from the absurd.*¹

1.1 Overview

1.1.1 Beethoven's 'new path' – the issue of syntax

I clearly remember an afternoon in the spring of 2018 at King's College, Cambridge, where my reading of the secondary theme in the first movement of Beethoven's Op. 95 string quartet, the 'Serioso,' was firmly rejected. Having listened without a score, my ears assigned the label 'transition' to the D-flat major theme that enters in b. 21, and 'secondary theme' to the material starting in b. 40 following the emphatic pause in b. 39.

Figure 1 Beethoven: String Quartet in F minor, Op. 95/i, bb. 18-22



¹ Cardinal Basil Hume OSB, *To Be a Pilgrim: A Spiritual Notebook* (London: St Pauls Publishing, 1984), 49.

Figure 2 Beethoven: String Quartet in F minor, Op. 95/i, bb. 38-42



My rationale was as follows: bearing in mind the average proportion of a first movement, the arrival of this D-flat theme was far too premature for it to be considered as marking the onset of the secondary theme. My interpretation was based on the syntactical and sonata guidelines outlined in William Caplin's form-functional theory and James Hepokoski and Warren Darcy's Sonata Theory, perhaps the two most influential formal theories of in our time.² Of course, I was duly informed during a supervision that the academically correct secondary theme is that which enters in b. 21.

This string quartet – replete with 'disruptions, harmonic oddities, and formal surprises'³ – hails from the end of Beethoven's middle period, the start of which was marked by the composer's 'new path' pronouncement; the style in which this piece is grounded, then, can be traced to Beethoven's 'new path.'⁴ I believe that the 'new path' works by overturning the syntactical principles commonly found in the Mozartean system. The reorganisation of syntax allows Beethoven to traverse an uncharted territory that has since been an endless source of fascination and ambiguity for scholars and listeners alike. As pointed out by Carl

² William Earl Caplin, *Classical Form : A Theory of Formal Functions for the Instrumental Music of Haydn, Mozart, and Beethoven* / William E. Caplin. (New York and Oxford: Oxford University Press, 2001); James Hepokoski and Warren Darcy, *Elements of Sonata Theory: Norms, Types, and Deformations in the Late-Eighteenth-Century Sonata*, Reprint edition (Oxford: Oxford University Press, U.S.A., 2011).

³Mark Evan Bonds, 'Irony and Incomprehensibility: Beethoven's "Serioso" String Quartet in F Minor, Op. 95, and the Path to the Late Style', *Journal of the American Musicological Society*, 70.2 (2017), 285–356, 286.

⁴ See Laura Erel, 'On (Mis)Hearing Beethoven: Syntactical (Dis)Organisation in the First Movements of His Middle-Period String Quartets' (unpublished MPhil thesis, University of Cambridge, 2018).

Dahlhaus, by the time the 'Eroica' was published in 1803-04, Beethoven's contemporaries were already well aware that he had entered upon a "'new path",' and that his works at the start of the nineteenth century represented 'a "qualitative leap"' compared to his earlier output.⁵ The 'new path' music invites listeners to be co-creators by inviting them to assume 'the burden of responding to – and thereby completing, as it were – the aesthetic challenges put forward by the composer.'⁶ The fact that Beethoven's 'new path' represents a stylistic leap from what was then considered mainstream means that a different interpretation of Classical syntax is required to interpret this output; in other words, the rules of the game have changed, and it is imperative that participants familiarise themselves with the new rules before joining: Inasmuch as syntax regulates the way musical elements are organised, it is a crucial tool for comprehension.

In order to grasp the meaning of an innovation, we inevitably need to compare it to what comes before. Caplin's form-functional theory marks a watershed in the theory of musical form for its thorough treatment of Viennese Classical syntax, which deals with the works of Mozart, Beethoven, and Haydn. That notwithstanding, Mozartean syntax remains the most commonly understood definition of Classical grammar.⁷ To grasp fully the meaning of the 'new path', it is only logical that we seek to understand conventional Classical syntax first, after which the following mental operations come into play: 1) cross-reference Beethoven's practice with Mozart's more conventional High Classical style, whilst at the same time, 2) turning the latter on its head, so that we can appreciate Beethoven's innovation fully.

⁵Carl Dahlhaus, *Ludwig van Beethoven: Approaches to His Music*, trans. by Mary Whittall (Oxford: Clarendon Press, 1991), 173.

⁶Bonds, 'Irony and Incomprehensibility: Beethoven's "Serioso" String Quartet in F Minor, Op. 95, and the Path to the Late Style', 287.

⁷ See, for example, L. Poundie Burstein, 'Mid-Section Cadences in Haydn's Sonata-Form Movements', *Studia Musicologica, Haydn 2009: A Bicentenary Conference Part I*, 51.1 (2009), 91–107.

That said, this procedure operates on the assumption that the enthusiastic admirer of the 'new path' is well-versed in the art of music theory; furthermore, they will also have a keen set of ears that has been sharpened thanks to years of training and exposure. Only those equipped with such tools are able to discern and make sense of Beethoven's quirky compositional practices. My misreading of the 'Serioso' demonstrated just how differently syntax could be perceived with and without a score.

1.1.2 The audibility of syntax and music theory

Studying musical syntax means participating in a formal educational scheme; in the UK, the most common route involves taking Music as a subject for one's ABRSM, GCSE, and A-Level examinations, followed by reading it at university. Fledgling analysts go through the various theories of musical grammar and practise what principles they have imbibed by applying them to musical works, i.e. by undertaking analyses. In the process, they also learn to listen, to recognise signposts that formerly meant nothing. All these, however, imply that institutional training is an imperative for syntactical comprehension. Is musical syntax an uncharted territory for the uninitiated, or is it merely a question of whether the appreciation is ever going to be made explicit through education?

If there are two things that I have learnt from my 'Serioso' misreading, it is that training is not a guarantee, and theory does not always reflect musical reality. That afternoon, I walked home not only with a new reading of the opening to Op. 95, but also the following question that form the lynchpin of this study: Is Caplin's form-functional theory – that is, the grouping principle and the structural-expressive properties that direct this grouping process – aurally perceptible? Is the beginning-middle-end framework central to Caplin's theory manifest in the way that Classical repertoire is processed in real-time?

The theory and its claims are easily demonstrable on paper: the theory parses the main syntactical trends that govern the Classical repertoire, giving compositions from the period a

certain set of unifying traits that distinguishes them from the late-Romantics, Bach, or Gregorian chant. What if, however, there are no scores as visual and comprehensive aid? Can syntax still be perceived and verified in real-time, even by those who have never been formally trained in the Caplinian school? Are claims made in theory-based analyses verifiable perceptually, or are they restricted to paper and therefore divorced from real-time hearing? Ultimately, I am interested to find out whether Classical syntax as manifest in form-functional theory is more than a theorist-made phenomenon.

Throughout this dissertation, the use of the word 'syntax' in the musical sense refers to the grouping structure and the musical properties that enable this grouping procedure as laid out in Caplin's theory. Since the theory is grounded on the repertoire of Mozart, Beethoven, and Haydn, any assertions relating to syntactical practice in the Classical era are limited to that observed in these composers' works. The term 'Classical syntax' as appears in this dissertation is therefore limited in its meaning: it is restricted to Caplinian practice, which in the first place is set within the boundary of the works of three composers.

1.1.3 Defining musical syntax and its importance

Syntax is a paramount concept in language. Defined as 'the grammatical arrangement of words in a sentence',⁸ it is a system that governs and enables the multiple logical permutations of words in any language, thus ensuring comprehensibility without anyone having to have come across every vocabulary a language possesses. In his book, *Aspects of the Theory of Syntax*, Noam Chomsky remarks:

The idea that language is based on a system of rules determining the interpretation of its infinitely many sentences is by no means novel . . . Nevertheless, within modern linguistics, it

⁸'SYNTAX | Meaning in the Cambridge English Dictionary'
<<https://dictionary.cambridge.org/dictionary/english/syntax>> [accessed 28 March 2019].

is chiefly within the last few years that fairly substantial attempts have been made to construct explicit generative grammars for particular languages and to explore their consequences.⁹

Music, too, has this linguistic tool at the heart of its conception. Carl Schachter and Edward Aldwell argue that

One way that music resembles language is that the order of things is crucial in both. 'I went to the concert' is an English sentence, whereas 'I concert went the to' is not. Similarly, $I - VII^6 - I^6 - II^6 - V^7 - I$ [...] is a coherent progression of chords, whereas $I - I^6 - VII^6 - II^6 - I - V^7$ [...] is not . . . In the study of language the word syntax is used to refer to the arrangement of words to form sentences; word order is a very important component of syntax. In studying music, we can use the term harmonic syntax to refer to the arrangement of chords to form progressions; the order of chords within these progressions is at least as important as the order of words in language.¹⁰

Harmonic syntax alone, however, is not a sufficient enough tool by which we can organise musical grammar: on its own, harmony is a local phenomenon at the lower end of musical hierarchy. Enter the work of Caplin: an ambitious venture into the world of Classical grammar, a guidebook whose claims are founded on an exhaustive survey of repertoire from the period. 'The specific way a musical passage expresses a more general temporal quality, such as beginning, [middle], ending, [etc]' – this is Caplin's definition of formal function, which is reminiscent of their linguistic counterparts: subject, verb, object.¹¹ Caplin's theory traces the hierarchical construction of music from a temporal perspective, i.e. how a musical unit's harmonic and melodic make-up allows listeners to "chunk" . . . the music into discrete

⁹Noam Chomsky, *Aspects of the Theory of Syntax* / Noam Chomsky. (Cambridge, Mass.: MIT Press, 1969), v.

¹⁰Carl Schachter and Edward Aldwell, *Harmony and Voice Leading* (Australia: Thomson/Schirmer, 2003), 139.

¹¹Caplin, *Analyzing Classical Form: An Approach for the Classroom* (New York: Oxford University Press, 2013), 707.

units of time.¹² Relatively straightforward to parse (compare the period's creations to Bach's fugues or late-Romantic symphonies, for example) yet never dull, the Classical repertoire thus provides an ideal starting point for those wishing to study musical grammar at a deeper level.

1.1.4 Musical irony: when syntax plays a trick on hearing

Beginning, middle, and ending are general terminologies that illustrate the way we experience music. In the absence of verbal markers, these temporal qualities are our only signposts when trying to make sense of music. There are times, however, when composers manipulate these markers, as is, for example, the case in the syntactical reorganisations of Beethoven's 'new path'. Such a manoeuvre effectively induces formal ambiguity that throws the listener off-course.

Such strokes of genius often give rise to the possibility of having multiple interpretations; however, as my 'Serioso' encounter illustrated, not all alternative readings are correct. Nevertheless, being aware of a plethora of alternative interpretations when listening to music is not necessarily a phenomenon to be frowned upon. Here, I would like to bring in another linguistic concept, namely irony. According to the Cambridge English dictionary, irony is defined as follows:

1. a situation in which something which was intended to have a particular result has the opposite or a very different result;
2. the use of words that are the opposite of what you mean, as a way of being funny;

¹²Caplin, 'What Are Formal Functions?', in *Musical Form, Forms & Formenlehre: Three Methodological Perspectives*, ed. by Pieter Bergé (Leuven: Leuven University Press, 2009), pp. 21–40, 23. Also see Fred Lerdahl and Ray Jackendoff, *A Generative Theory of Tonal Music*. (Cambridge, Mass.: MIT Press, 1983), 13-17 and 36-67.

3. a style of writing in which there is a noticeable, often humorous, difference between what is said and the intended meaning.¹³

These meanings are heavily associated with language and literature. Irony is not a concept casually used to describe a piece of music; yet, as Mark Evan Bonds has pointed out in his article on Haydn and Laurence Sterne, it can constitute a central concept, 'the essence of much that was new and controversial about [a] composer's instrumental works.'¹⁴ Evan Bonds notes that the 'fusion of the witty and sentimental in such a way that a work can be interpreted either at face value or as a comic commentary upon itself points specifically to the technique of irony.'¹⁵ Haydn's capacity to mix lighter elements with the more serious ones in the same piece is of course well-known. An anonymous essay in *Allgemeine musikalische Zeitung* makes the following comparison between Haydn and Sterne: 'The merry, mischievous, good-natured, ingenious humour [*Laune*], combined with a high-spirited fantasy, with strength, learnedness, and fullness – in short, this revelry in a springtime of notes and beautiful modulations – can make life pleasant.'¹⁶ Like Haydn, Sterne is famous for his 'peculiar disposition,' his *originelle Laune*, which 'figures prominently in virtually every eighteenth-century discussion of the English writer's style.'¹⁷

Detecting humour in music, however, is arguably easier said than done. Most of the time, it is obvious when one is making a verbal joke. The medium of instrumental music, on the other hand, complicates things: forget deciphering the joke in question, how do we even

¹³'Irony', *Cambridge Academic Content Dictionary* (New York: Cambridge University Press, 2009) <<https://dictionary.cambridge.org/dictionary/english/irony>> [accessed 20 March 2020].

¹⁴Bonds, 'Haydn, Laurence Sterne, and the Origins of Musical Irony', *Journal of the American Musicological Society*, 44.1 (1991), 57–91.

¹⁵Bonds, 'Haydn, Laurence Sterne, and the Origins of Musical Irony', 63.

¹⁶'Die heitere, schalkhafte, gutmüthige, geistreiche Laune, verbunden mit der übermüthigen Phantasie, mit der Kraft und Gelehrsamkeit und Fülle – kurz dies Schwelgen in einem Frühling von Tönen und schönen Modulationen, kann das Leben angenehmmachen.' Anon, 'Briefe an einen Freund ueber die Musik in Berlin: Zweyter Brief vom 25sten October', *Allgemeine Musikalische Zeitung* (Leipzig, 19 November 1800), 3/8 edition, 130.

¹⁷Bonds, 'Haydn, Laurence Sterne, and the Origins of Musical Irony', 65.

know if there is a joke in the first place? Do we have a model that could be counted upon to act as a robust foundation on which to base our interpretation?¹⁸

Jean Paul Richter compares Sterne's writing, with its ironic style, to Haydn's music, as such:

Sterne, for example, repeatedly speaks at length and weightily about certain phenomena before finally concluding that not a single word of it all, in any case, has been true. One can sense something similar to the audacity of annihilating humour – and at the same time an expression of disdain for the world – in certain music, e.g., Haydn's, which annihilates entire key-areas through one that is foreign, and which storms along between pianissimo and fortissimo, presto and andante.¹⁹

Richter's argument is adopted by Evan Bonds to comment upon Haydn's syntactical practice:

Within the dynamics of the temporal arts . . . it is also the reader's or listener's anticipation of what is to follow that is annihilated . . . In thwarting these expectations, Haydn does not "disdain" his listeners in the sense of ignoring them – indeed, he calculates and plays upon their anticipation masterfully – but the effect of such devices, as Jean Paul observes, is to create a sense of separateness and distance from the world at large, including the listener. [Ultimately,] Humour's "annihilating" essence is thus paradoxically an "infinite" quality as well, in that it opens the door to a world of mirrors reflected within mirrors.²⁰

In a musical encounter, the ability to perceive the presence of this distance arguably allows listeners to appreciate the artwork in two ways: subjectively ('art as an aesthetic experience')

¹⁸ See Kevin Korsyn, 'Towards a New Poetics of Musical Influence', *Music Analysis*, 10.1/2 (1991), 3–72 <<https://doi.org/10.2307/853998>>.

¹⁹ 'So spricht z. B. Stenermehrmals lang und erwägend über gewisse Begebenheiten, bis er endlich entscheidet: es sei ohnehin kein Wort davon wahr. Etwas der Keckheit des vernichtenden Humors Ähnliches, gleichsamen Ausdruck der Welt-Verachtung kann man beimancher Musik, z. B. der Haydnschen, vernehmen, welche ganze Tonreihen durch eine fremde vernichtet und zwischen Pianissimo und Fortissimo, Presto und Andante wechselnd stürmt.' Jean Paul Richter, *Vorschule der Aesthetik*, ed. by Norbert Miller, Werke, 1 (Munich: Carl Hanser, 1963). The comments regarding Haydn appeared in the first edition of *Vorschule* in 1804; those on Sterne were added for the second edition in 1813.

²⁰ Bonds, 'Haydn, Laurence Sterne, and the Origins of Musical Irony', 63.

and objectively ('art as a technique').²¹ Writing on musical intertextuality, Kevin Korsyn has called for the need of musical models that 'tell us where to look, what to observe, what counts as a fact.'²² The awareness of this distance in artwork is one such model. The resulting paths of appreciation offer listeners the chance not only to enjoy the piece as an aesthetic object, but also to examine the content interactively. This interactive mode of musical engagement encourages listeners to be active actors in the musical creation itself, which could lead to a more meaningful and enriching experience. As Evan Bonds puts it, by being 'reminded that he is confronting a work of fiction, the reader . . . is made all the more conscious of the artificiality of the process by which the artist is manipulating the reader's evolving response.'²³ This is comparable to Harold Bloom's understanding of irony: 'We might phrase this as a conscious state of rhetoricity, the poem's opening awareness that it *must be mis-read* because its signification has wandered already.'²⁴ Korsyn notes that the amenability of such a reading of the concept of irony to music can be attributed to Bloom's indebtedness to his precursor Walter Pater, whose belief it was that '*all art constantly aspires towards the condition of music*'.²⁵

Taking into account this tension between the drastic and the gnostic – to borrow Carolyn Abbate's terminologies²⁶ – can indeed guide listeners towards a more fulfilling relationship with music. As Korsyn has put it, 'We must reimagine musical rhetoric, using it to reinvigorate our analytical methods, so that we can move beyond a purely neutral description of structure, to explain why particular structures are used rather than other, equally "logical" possibilities.'²⁷ At the same time, however, this dichotomy highlights one of

²¹Bonds, 'Haydn, Laurence Sterne, and the Origins of Musical Irony', 72.

²² Korsyn, 'Towards a New Poetics', 5.

²³Bonds, 'Haydn, Laurence Sterne, and the Origins of Musical Irony', 69.

²⁴ Harold Bloom, *A Map of Misreading* (Oxford: Oxford University Press, 1975), 71, original italics.

²⁵ Walter Pater, *The Renaissance: Studies in Art and Poetry* (Chicago: Pandora Books, 1977), 135, original italics. For Korsyn's argument, see 'Towards a New Poetics', 12.

²⁶ Carolyn Abbate, 'Music - Drastic or Gnostic?', *Critical Inquiry*, 30.3 (2004), 505–36.

²⁷ Korsyn, 'Towards a New Poetics', 15.

the biggest musicological gulfs, which sees music perception on one side, and theory and analysis on the other. It is safe to assume that juggling 'art as an aesthetic experience' and 'art as a technique' is a form of mental acrobatic that can be easily carried out by trained analysts and theorists. After all, they have undergone rigorous training in the theories underpinning these practices, as well as familiarised themselves with the genre. For such expert listeners, syntactical comprehension can almost be said to be second nature, allowing them to appreciate fully (or at least to a large extent) the display of musical irony. In the context of this study, the same could be said of those who have been trained in the Caplinian tradition – it is likely that their musical processing has been conditioned by their exposure to Caplinian tenets.

Is this type of understanding – the gnostic, shall I say, rather than the drastic – the exclusive property of the initiated, however? Are Caplinian claims perceptible only to those who have studied the theory? Is there any chance that this syntax could be perceptible to those who are amateurs? Does theory and analysis constitute a bastion meant exclusively for the intellectually minded, or is it in fact a discipline that is closely connected to our inner faculty?

1.1.5 Repertoire for musical puzzles

Earlier, I cited Evan Bonds' proposition regarding the ability of Haydn's creations to engage the reflective capacity of the audience; Haydn, however, is not the only composer whose music extends this invitation. In forging his 'new path,' Beethoven, too, flouts conventions and invites listeners to play an active role in understanding his music. As the first publication that follows the composer's declaration to embark on a 'new path,' the Op. 31 piano sonatas present themselves as an appropriate case study to illustrate the idea of musical irony.

This PhD seeks answers to these questions. More specifically, I investigate the perceptibility of Caplin's theory of syntax in real-time listening across a spectrum of

expertise, i.e. from the non-analysts to those formally trained in the discipline. Given my research interest in Beethoven, I base this project on his piano sonata, which I first investigated as part of my undergraduate dissertation using form-functional theory and Sonata Theory. This project, then, is in many ways a culmination of my university research life.

Seeing as Beethoven's syntax shares Mozartean principles, I am going to use Mozartean precedents as the benchmark against which results will be compared. Mozart, after all, has long been considered by many to be the embodiment of the Classical style.²⁸ That said, I also broach the question of whether our conception and understanding of Classical syntax is largely (if not entirely) based on the Mozartean scheme. The many textbooks on Classical form and style, despite citing pieces by Mozart, Haydn and Beethoven, ultimately use trends found in Mozart's repertoire as the foundation of most of their arguments. It is little wonder, therefore, that Classicism in music is, for many, synonymous with Mozart. Given this phenomenon, I also unpack this stereotype by including a Haydn piano sonata movement. This test reveals the extent to which our understanding of Classical syntax is based on Mozartean principles as opposed to the music of Haydn, Mozart and Beethoven more generally, as has been claimed by many.²⁹ The inclusion of Haydn in this equation will also help investigate the extent to which Beethoven's 'new path' music is perceived to be different from his contemporaries': when pitted against Mozart, are Beethoven and Haydn heard to be just as unusual, or is one more so than the other.

1.1.6 The gulf between theory and perception

Carol Krumhansl and Roger Shepard observed the existence of 'a noticeable gap between the richness and power of the total structure implied by music theory, on the one hand, and

²⁸ In their repertoire survey, for example, James Hepokoski and Warren Darcy primarily rely on compositions by Mozart, which inevitably resulted in two rather Mozartean theories.

²⁹ See for example, Bruno Nettl, 'Mozart and the Ethnomusicological Study of Western Culture (An Essay in Four Movements)', *Yearbook for Traditional Music*, 21 (1989), 1–16, 8.

detailed experimental demonstrations and quantifications of that structure, on the other.'³⁰

This was written in 1979, and it would be remiss not to acknowledge the progress that has been made between now and then. Nevertheless, there remain knowledge gaps in both fields that I believe can be addressed by combining the worlds of theory, analysis and empirical musicology in a hybrid study. After all, 'we are all, at root, listeners'³¹ – it is therefore important to consider music both as it is seen on paper and as it is heard, within the realms of the literate musical tradition. Neither takes precedence over the other – a richer understanding of music arguably requires the critical deployment of both the scientific and the perceptual. Writing in 1973, Leonard Meyer could well have described the motivation behind this project himself: 'there are reasonable grounds for believing that the musical processes and structures explicitly conceptualised in criticism are those which evoke affective responses in sensitive and experienced listeners.'³²

The divorce between music theory/analysis and music perception is especially pronounced in cases where unusual compositional practices take place, such as is the case with Beethoven's 'Serioso' Quartet I related earlier. The correction offered to me more or less assumed that syntactical properties observed on paper are audible; as Helen Brown has put it, 'the analyst is free to assume that the listener will hear any relational features asserted.'³³ Similarly, William Thomson remarks: 'As analysts, we are promised a great deal; but one wonders if this is empiricism properly applied, *to an area whose very being depends upon the nature of the human response, the way in which the human psyche transforms sensory input into meaning.*'³⁴

³⁰Carol L. Krumhansl and Roger N. Shepard, 'Quantification of the Hierarchy of Tonal Functions within a Diatonic Context', *Journal of Experimental Psychology: Human Perception and Performance*, 5.4 (1979), 579–94 <<https://doi.org/10.1037/0096-1523.5.4.579>>, 582.

³¹'The Future of Theory', *Indiana Theory Review*, 10 (1989), 65–107, 96.

³²Leonard Meyer, *Explaining Music: Essays and Explorations*, 6.

³³H. Brown, 'The Interplay of Set Content and Temporal Context in a Functional Theory of Tonality Perception', *Music Perception: An Interdisciplinary Journal*, 5 (1988), 219–49, 243.

³⁴William Thomson, 'The Problem of Music Analysis and Universals', *College Music Symposium*, 6 (1966), 89–107, 91, my emphasis.

Eugene Narmour once asserted: '[Just] because a composer carefully plans out a piece in terms of what he thinks are structural relationship [this] by no means ensure that these relationships will be perceived as such.'³⁵ Proponents of the New Musicology would perhaps be only too happy to support Narmour's observation. As Joseph Kerman famously puts it: 'Analysis seems too occupied with its own inner techniques, too fascinated by its own "logic," and too sorely tempted by its own private pedantries, to confront the work of art in its proper aesthetic terms.'³⁶

At this point, it is worth our while to consider what 'aesthetic terms' actually mean. There are broadly two categories of responses by which we can attend to music, and they are what Phaedrus describes in *Zen and the Art of Motorcycle Maintenance* as 'classical' and 'romantic': 'A classical understanding sees the world primarily as underlying form itself. A romantic understanding sees it primarily in terms of immediate appearance.' The argument further evolves: 'The romantic mode is primarily inspirational, imaginative, creative, intuitive. The classic mode, by contrast, proceeds by reason and by laws – which are themselves underlying forms of thought and behaviour.'³⁷

It is worth looking into this difference further. Keith Swanwick, for example, has differentiated between the aesthetic and the artistic:

Music has an aesthetic surface for sure – the sensory effect of sound . . . This is just one part of artistic experience and it is not synonymous with art . . . in the context of "music", "art" means more than just a skill. Artistry in music is indeed in part a skilled endeavour, but it is

³⁵Eugene Narmour, 'Some Major Theoretical Problems Concerning the Concept of Hierarchy in the Analysis of Tonal Music', *Music Perception: An Interdisciplinary Journal*, 1 (1983), 129–99, 132.

³⁶Joseph Kerman, 'A Profile for American Musicology', *Journal of the American Musicological Society*, 18.1 (1965), 61–69, 65. Kerman also further criticises the discipline's objective to 'discern and demonstrate the functional coherence of individual works of art' in Kerman, 'How We Got into Analysis, and How to Get Out', *Critical Inquiry*, 7.2 (1980), 311–31; quote at 312.

³⁷Robert M. Pirsig, *Zen and The Art of Motorcycle Maintenance: An Inquiry into Values* (Uxbridge: Corgi, 1976), 66.

also the creation and performance of something that is expressive and coherently structured in a sonorous medium.³⁸

In a similar fashion, Bennett Reimer has also advised against using 'aesthetic' and 'artistic' interchangeably,³⁹ for this 'semantic slippage [can only lead] to curious conceptual problems.'⁴⁰

Such 'curious conceptual problems' are seen in the arguments of those who argue that the act of analysis robs music of its spontaneity, diminishing the 'here and now' that makes music so powerful to many.⁴¹ Lawrence Kramer once wrote that

informal interpretations of music, phrases just blurted out, unsystematic, freely metaphorical or epithetical, not especially articulate, are important far in excess of their apparent lack of substantive weight . . . *Meaning, whether in music, image, or text, is a product of action rather than structure.*⁴²

Here, Kramer, like Thomson, alludes to the universality and immediacy of music, to the ability of every human – expertise notwithstanding – to derive meaning from music, even if it is only a sliver of what the music actually entails. Kramer and Thomson, however, have overlooked the fact that to describe the immediate and spontaneous in musical experience is, as Julian Horton writes,

not the same as immediacy itself; rather, it is immediacy mediated by a conceptual framework, and consequently by some form of analytical reflection . . . it is not that analysis suppresses the subjective in musical experience, but rather that placing an emphasis on immediacy obscures the fact that it always collapses back into the analytical. We never write the immediate, but an analytical strategy masquerading as immediacy. The characterization of

³⁸Keith Swanwick, *Musical Knowledge: Intuition, Analysis and Music Education* (London: Routledge, 1994).

³⁹B. Reimer, *A Philosophy of Music Education* (New Jersey: Prentice Hall, 1989), xiii.

⁴⁰Swanwick, 35.

⁴¹For example, see Abbate's article on the drastic and the gnostic.

⁴²Lawrence Kramer, 'Musicology and Meaning', *The Musical Times*, 144.1883 (2003), 6–12, 7–8, my emphasis.

immediacy as the locus of decentered subjectivity is therefore misleading; it simply represents a projection of the analytical.⁴³

Kramer's dictum – that meaning is 'a product of action rather than structure' – should therefore be modified to the following: Meaning . . . is a product of structure and action, both of which have been mediated by their abstract concepts.

It is also important to note Kramer's alluding to music as devoid of any inherent properties apart from those ascribed by humans (*'Meaning, whether in music, image, or text, is a product of action rather than structure.'*), an idea that is similar to Kerman's 'proper aesthetic terms. 'Kerman has also suggested that what scholars would like is 'a discipline that would allow them to work, with rigour and intelligence, close to *the music that moves them*.'⁴⁴

But what exactly is the thing that moves them? What is it, and how is it capable of affecting listeners emotionally? In emphasising 'meaning', 'affective experience', and 'emotional responses', Thomson, Kerman, and Kramer seem to have sidestepped the inner mechanics of the craft themselves, the only tangible evidence of this immaterial form of activity. This is unlike Meyer, who considers both the affective and the intellectual: 'musical processes and structures explicitly conceptualised in criticism are those which evoke affective responses'.⁴⁵ This sentiment is also that held by the German-born Swiss poet, Hermann Hesse: in teaching poetry, Hesse emphasises the importance of making 'poetry accessible . . . by imparting a precise knowledge of its linguistic and metrical strategies', rather than telling students that 'poetry is one of the manifestations of the divine'.⁴⁶ Like music, poetry can be simply thought of as esoteric, or it can be dismantled to enable access to the esoteric. Meyer

⁴³Julian Horton, 'Postmodernism and the Critique of Musical Analysis', *The Musical Quarterly*, 85.2 (2001), 342–66, 357.

⁴⁴Kerman, 'A Profile for American Musicology', 67.

⁴⁵Leonard Meyer, *Explaining Music: Essays and Explorations*, 6.

⁴⁶H. Hesse, *The Glass Bead Game* (Harmondsworth: Penguin, 1976), 116.

and Hesse recognise the nature of this two-dimensional existence – the perceptual and the conceptual, interdependent on each other – something that Thomson, Kerman, and Kramer seem to have missed.

Let us consider subject matters that are more tangible than music. King's College Chapel in Cambridge and Durham Cathedral are two magnificent buildings that never fail to elicit gasps of wonder from visitors, but this expression of admiration alone does not define the landmarks. Their architectural styles are worthy of curiosity in their own rights, as are their construction histories, the materials and tools used in the process – these are some of the things that define said buildings for what they are; together, these properties endow the aura of grandeur that is perceived by onlookers. Of course, grandeur is not the only impression that can arise in the mind of a visitor – his encounter with such imposing sites could resurrect various memories from different parts of his life, and such an experience will be different from person to person. The constant variables that make up the identities of King's Chapel and Durham Cathedral are their construction dates, their architectural styles and engineering facts, and so on.

Similarly, the fact that Wagner's *Siegfried Idyll* brought tears to my eyes speaks more about my response to it – it does not tell me what *Siegfried Idyll* is. As C. S. Lewis writes in *The Abolition of Man*,

When the man [looked at a magnificent waterfall and] said *This is sublime*, he appeared to be making a remark about the waterfall . . . Actually . . . he was not making a remark about the waterfall, but a remark about his own feelings. What he was saying was really *I have feelings associated in my mind with the word "Sublime"*, or shortly, *I have sublime feelings*[induced by the sight of the waterfall].⁴⁷

⁴⁷C. S. Lewis, *The Abolition of Man* (Glasgow: Fount Paperbacks, 1978), 7, original emphasis.

The affective or the conceptual on their own does not give us sufficient information that we can use to process the world around us. Taken individually, each can threaten to obscure the other, leading to a distorted point of view. This, I believe, is the reason behind the various knowledge gaps in empirical musicology, as well as the inability of theory and analysis to account fully for the way music is heard. To take into account the intellectual process of music by no means lessens the value of spontaneous impression, and vice versa. As Swanwick has noted,

intuitive knowledge itself of necessity embodies certain processes of logical ordering, at least to the extent of a sequence of perceptual organisation and a sense of consequence or causality. [Furthermore,] intuitive knowledge 'typifies most of our day-to-day realities, although by itself intuition has limitations[, which thus necessitates the conceptual.]'⁴⁸

To consider only the aesthetic without the artistic is to obtain only half the picture. I shall quote Swanwick at length here:

When we say we are moved by music, what is moving in us are the shadows of many previous experiences . . . These insights are so profound that in the realisation of this deep strand of knowing we may be led to believe that music is so powerfully private and unique that it can never be spoken about, analysed or assessed. This is not so. The possibility of a profound sense of musical value exists only because of the development of sensitivity and skills with sound *materials* and the ability to identify *expression* and comprehend musical *form*. These strands of knowledge are neither completely subjective nor entirely concealed from view and we can find them at work whenever people talk clearly or write well about music as articulate connoisseurs, sensitive critics.⁴⁹

I believe that we stand a better chance of making sense of the world around us by combining our affective and intellectual responses. To borrow the words of philosopher Mary

⁴⁸Swanwick, *Musical Knowledge: Intuition, Analysis and Music Education*, 20.

⁴⁹Swanwick, 20, original emphases.

Warnock: 'Without imagination, we could never apply concepts to sense experience. Whereas wholly sensory life would be without any regularity or organisation, a purely intellectual life would be without any real content.'⁵⁰ Heard purely from the conceptual perspective, music would lack the emotive power that has enabled its visceral influence on humanity; from the purely affective, music would be reduced to the arbitrary – 'we can be intuitively wrong, bigoted, biased'⁵¹ – and the utilitarian, useful only if it can appeal to a certain persona, or serve a certain purpose.

Addressing critics who attack analysis as conceptualising 'what should be felt and is, therefore, somehow inhuman,' Meyer writes that 'the charge rests upon a doubtful dichotomy: namely, that which separates mind and body, and intellect from affect. Our emotional responses to the world are invariably linked to cognitive patternings. Conceptualisation [therefore] precedes and qualifies affective experience.'⁵²

With this in mind, we can see how Kramer's 'informal interpretations' can in fact be applicable to proponents of the New Musicology as well as *Formenlehre*. Whilst promoting the universality of music by highlighting its accessibility, Kramer is in fact also hinting that despite the informality surrounding our personal musical experience, there lies an innate ability for formal perception that manifests itself precisely in those informal remarks. The fact that we could make observations about the music we hear implies the presence of a cognitive processing system that recognises technical aspects that make music what it is. We might not all be able to parse a sonata down in a manner recognised by the 'New *Formenlehre*' movement, but we could recognise a theme and its reprise, or sense the onset of an ending given a certain rhetoric.

Seen from this perspective, the gap between theory-analysis and perception is not as wide as some have made it out to be. How we perceive music is reflected in writings about

⁵⁰M. Warnock, *Imagination* (London: Faber, 1976), 30.

⁵¹Swanwick, 31.

⁵²Leonard Meyer, *Explaining Music: Essays and Explorations*, 6.

music, and vice versa. Furthermore, contrary to popular belief, theory and analysis do not constitute an attempt at straitjacketing musical experience inasmuch as no two interpretations are the same. What one analyst perceives as, say, the second subject of a sonata might not correspond with another's reading of the same music. Analysis, being an interpretation, 'necessarily entails the peculiar view of the interpreter.'⁵³ There is very little, if any, difference between this particular reality and the reality of perceiving music as a listener.

Theory and analysis are not the be-all-end-all of a musical experience: 'A specific musical experience which combines the perception of musical events with the subjective peculiarities of an individual human psyche at a specific moment in its history, *is unique*. Criticism cannot fully know or explain that experience. *Nor is it concerned to do so*.'⁵⁴ If we aspire to understand our own understanding of music, however, we do need a starting point that is regulated and verifiable. Jean-Jacques Nattiez wrote that 'a cumulative advancement of knowledge cannot be developed on the basis of impressions.'⁵⁵ Similarly, Kelly Oliver has written that by 'privileging raw feelings over the cooked analysis [, one] not only fuels[sic] anti-intellectualism, but also conceals the socio-historical context that produces those feelings.'⁵⁶ Considering the intangibility of music, this starting point must, as much as possible, solidify this aural phenomenon and reduce it to facts; only then can we begin to discuss music meaningfully instead of arbitrarily.

Regardless of our own experience and feelings, we must acknowledge that 'there are basic aspects of any object, musical or otherwise, that are publicly verifiable and thus not subject to the fantasy of a private imagination.'⁵⁷ No one, for example, could dispute the fact

⁵³Thomson, 89.

⁵⁴Leonard Meyer, *Explaining Music: Essays and Explorations*, 4 (second emphasis mine).

⁵⁵Jean-Jacques Nattiez and Anna Barry, 'Varese's "Density 21.5": A Study in Semiological Analysis', *Music Analysis*, 1.3 (1982), 243–340 <<https://doi.org/10.2307/854178>>, 244.

⁵⁶Kelly Oliver, 'Opinion | Education in the Age of Outrage', *The New York Times*, section Opinion <<https://www.nytimes.com/2017/10/16/opinion/education-outrage-morality-shaming.html>> [accessed 13 June 2020].

⁵⁷Thomson, 90.

that the opening of Mozart's 'Jupiter' Symphony is martial despite the various phrasings that may be used to describe the music. In his oft-cited study, Nicholas Cook finds that experimental subjects were not able to perceive long-range tonal plans; nevertheless, he notes that even 'if large-scale tonal relations are not themselves audible, that does not necessarily mean that they are of no musical significance: it may just be that that their influence on what is heard is an indirect one.'⁵⁸ Kramer's 'informal interpretations' suggest much about how music is comprehended, but it does not reflect the entirety of the piece. Humans who are not colour-blind all have the ability to see the colour red, but each will arguably process the shade in a slightly different way; this does not, however, tell us the true essence of the colour itself, nor do the myriad of opinions regarding the perceived shade affect the nature of the shade per se.

Of course, it would be remiss not to acknowledge that Kerman's statement ('Analysis seems too occupied with its own inner techniques, too fascinated by its own "logic," and too sorely tempted by its own private pedantries') is, to a certain extent, valid: analysis – as well as theory, on which the former is often based – operates on the assumption that the reader of the report can hear what the analyst hears in the music, that the things revealed by the music to the analyst are also available to the reader. As I have argued above, however, no two people hear nor process music identically, which means that analysis, far from being inward-looking and exclusive, is actually a very diverse field, where unique musical interpretations are taken as read. Here, the concept of musical irony comes to mind.

Within the dynamics of the temporal arts . . . it is also the reader's or listener's anticipation of what is to follow that is annihilated . . . [Ultimately,] Humour's "annihilating" essence is

⁵⁸Nicholas Cook, 'The Perception of Large-Scale Tonal Closure', *Music Perception: An Interdisciplinary Journal*, 5 (1987), 197–205, 204.

thus paradoxically an "infinite" quality as well, in that it opens the door to a world of mirrors reflected within mirrors.⁵⁹

Analysis helps to enrich musical experience by helping us 'understand and explain the relationships among and between musical events',⁶⁰ as well as allow us to discover different facets of our perceptual ability.

1.2 What cognitive study knows so far

There is a wide body of literature available from the field of cognitive psychology which attempts to reveal the various ways in which humans understand music. Back in the 1960s, the influential Leonard Meyer argued that music is 'a dynamic process. Understanding and enjoyment depend upon the perception of and response to attributes such as tension and repose, instability and stability, and ambiguity and clarity.'⁶¹ The ability to perceive such features in music is arguably strongly linked to knowledge-based expectation. The widely accepted theoretical framework is based on the concept of spreading activation, which describes memory as a network of interconnected nodes, each representative of a concept. Activating a node automatically triggers a spread of activity among related nodes, thus facilitating comprehension. In the context of Caplinian syntax, the trigger would be the musical properties that are suggestive of a particular function: tonic prolongation, for example, is suggestive of initiation, whilst liquidation is suggestive of continuation. The capacity to associate these properties with particular functions or locations in a piece of music, then, is linked to musical comprehension.

Cognitive psychologists have conducted numerous studies to examine listeners' understanding of music through surveys which measure aesthetic rating of chord sequences

⁵⁹Bonds, 'Haydn, Laurence Sterne, and the Origins of Musical Irony', 64.

⁶⁰Leonard Meyer, *Explaining Music: Essays and Explorations*, 4.

⁶¹Leonard Meyer, 'On Rehearing Music', *Journal of the American Musicological Society*, 14.2 (1961), 257–67, 257.

as well as understanding of cadential progressions, formal order, as well as hierarchical structure. By and large, psychologists concur that harmonic and structural awareness is a cognitive skill that is present at local level. That said, existing experimental designs arguably suffer from a lack of solid theoretical and analytical underpinning which, given the recent advances in the field of music theory, undermines the validity of existing results. The lack of inter-disciplinary communication has been noted by Eric Clarke who, back in 1989, suggested how inherently contrasting approaches and emphases have almost precluded a marriage of knowledge between cognitive psychology and music theory and analysis:

It is important to recognise at the outset that the formal approach to musical structure undertaken by composers and musicologists has a rather different aim from the approach of psychologists of music, and that it is in part these differences of aim that lead to some of the difficulties discussed [in this article]. Broadly speaking, the aim of musicologists . . . in tackling issues of musical structure can be characterised as the attempt to formulate theories of the structural relations within and between musical works . . . A correspondingly brief summary of the aim of psychologists of music is the development of theories of the mental processing of musical events . . . In a number of respects these aims are quite complementary, but the different disciplines . . . come into conflict in the way in which they describe their material, and in what they extract and evaluate as significant findings. To the psychologist it may, for instance, be very significant to demonstrate the existence of categorical perception for pitch . . . but the finding is of little or no value to a composer or analyst in the Western classical tradition who has almost certainly been treating pitch categorically as a matter of course.⁶²

In *Explaining Music*, Meyer argues that critical analysis, which is defined as that which 'seeks to understand and explain [the idiosyncrasies of] a particular composition . . . to

⁶²Eric F. Clarke, 'Mind the Gap: Formal Structures and Psychological Processes in Music', *Contemporary Music Review*, 3.1 (1989), 1–13, 1–2.

discover the secret of the singular,' is in fact inseparable from our understanding of art. He contests 'vehemently the notion that an intellectual response to works of art, and to the world in general, is inhuman or undesirable. Quite the opposite. The arts . . . are valuable and relevant because they are entertaining . . . to entertain . . . and to be entertained *by* ideas is both the most human and the most humane condition to which man can aspire.'⁶³

It is therefore the aim of this dissertation to bridge the gap between the two disciplines by incorporating theoretical and analytical findings into empirical testing. By so doing, not only will the latter have solid assumptions on which to base investigation and results analysis, the former (that is, the world of academic music), too, will benefit from having its assumptions tested in real-time.

That said, existing scholarship has shed light on many useful features which influence music perception, and here I discuss some of the papers which are most relevant to this dissertation.

In 1996, for example, Barbara Tillmann and Emmanuel Bigand segmented pieces by Mozart, Bach and Schoenberg and reversed their playing orders.⁶⁴ They hypothesised that this procedure would introduce harmonic and formal shocks to listener. Tillmann and Bigand's study takes as its precedent the two experiments carried out by Heidi Gotlieb and Vladimir Konečni in 1985, and Mitchell Karno and Konečni in 1992: the former re-organised the order of Bach's Goldberg Variations and found no difference in aesthetic response, although one must remember that this study simply re-ordered 32 complete musical entities, leaving little to the imagination; in the latter, the order of sections in the first movement of Mozart's K. 550 was changed, and again, no alteration in pleasure or interest ratings was

⁶³Leonard Meyer, *Explaining Music: Essays and Explorations* (Chicago: University of Chicago Press, 1973), 6 (original emphasis).

⁶⁴Barbara Tillmann and Emmanuel Bigand, 'Does Formal Musical Structure Affect Perception of Musical Expressiveness?', *Psychology of Music*, 24.1 (1996), 3–17 <<https://doi.org/10.1177/0305735696241002>>. The pieces used were: Mozart's Sonata in B-flat, K. 550/i; gigue from Bach's French Suite in D minor, BWV 812; and gigue from Schoenberg's Piano Suite Op. 25.

reported.⁶⁵ Building on these experiments, Tillmann and Bigand's study reports varied responses in the cases of Bach and Schoenberg. The Mozart, however, was deemed to be inoffensive, a finding which could perhaps be attributed to Tillmann and Bigand's segmentation procedure: firstly, all chunks are in B-flat major; secondly, all sections end with cadences, be it imperfect or perfect, which result in the various pieces neatly dovetailing into each other despite their reversed playing order; and thirdly, the fact that participants registered no change in listening pleasure despite the illogical cadential order could be attributed to the fact that imperfect cadence tends not to be processed on a global scale.⁶⁶ Furthermore, it could be said that Tillmann and Bigand's segmentation and overall experimental design privilege Bach and Schoenberg over Mozart as the latter, with its comparatively simpler texture and harmonic procedure, lends itself more naturally towards segmentation, thus eliciting 'neutral' responses.

The main issue that disadvantages Tillmann and Bigand's findings today is the lack of theoretical underpinning guiding the segmentation process. The same could be said of their experiment in 1998 – carried out in partnership with François Madurell – which focuses on the processing of harmonic cadences: in this study, they define as 'a sequence of two chords.'⁶⁷ Given that Caplin's recent definition of cadence that has been widely influential among theorists and analysts, it is hard to accept Tillmann, Bigand and Madurell's understanding of cadence, which ultimately invalidates their results to a large extent.⁶⁸ Even without contemporary definition of cadence, defining cadence merely as a sequence of two

⁶⁵ See Heidi Gotlieb and Vladimir J. Konečni, 'The Effects of Instrumentation, Playing Style, and Structure in the Goldberg Variations by Johann Sebastian Bach', *Music Perception: An Interdisciplinary Journal*, 3.1 (1985), 87–101 <<https://doi.org/10.2307/40285323>>; Mitchell Karno and Vladimir J. Konečni, 'The Effects of Structural Interventions in the First Movement of Mozart's Symphony in G Minor K. 550 on Aesthetic Preference', *Music Perception: An Interdisciplinary Journal*, 10.1 (1992), 63–72 <<https://doi.org/10.2307/40285538>>.

⁶⁶ For the local versus global processing of imperfect and dominant cadences, see Barbara Tillmann, Emmanuel Bigand, and François Madurell, 'Local versus Global Processing of Harmonic Cadences in the Solution of Musical Puzzles', *Psychological Research*, 61.3 (1998), 157–74 <<https://doi.org/10.1007/s004260050022>>.

⁶⁷ Tillmann, Bigand, and Madurell, 157.

⁶⁸ I have in mind Caplin's very thorough exposition on the nature of cadence in his 'The Classical Cadence: Conceptions and Misconceptions', *Journal of the American Musicological Society*, 57.1 (2004), 51–118.

chords is questionable as it gives the impression that any two chords can form a cadence, which is of course not true.⁶⁹

Aside from theorising the cadential concept, Caplin has in fact teamed up with colleagues to create a probability-based empirical study that scrutinises the way in which the brain predicts cadential movements.⁷⁰ This paper makes use of the Information Dynamics of Music model (IDyOM) to simulate the formation of schematic expectations. Although this study successfully proves widely held conceptions regarding the various types of cadence – that perfect authentic cadence (PAC) is the most affirmative and therefore most predictable in a cadential context, whilst evaded cadence (EV) is the weakest and least predictable event – this study's reliance on mechanical simulation is to my mind its weakest point. Despite IDyOM's close resemblance to the mechanism by which human listeners hear, process and form expectation, it remains an artificial contraption. This is arguably a major flaw for a study that takes schematic formation and expectation in the brain as its starting point, and one that has been acknowledged by the authors.⁷¹

The study of cadential processing often overlooks what is arguably the most crucial issue which underpins the entire procedure: whether listener can perceive original tonic at all given a particular musical extract. Elizabeth Marvin and Alexander Brinkman came close to uncovering the answer to this question by testing perception of tonal closure in the tonic, but ultimately their study fails to test participant's awareness of the initial tonic key.⁷² Marvin and Brinkman's paper explore seven key questions which include recognition of starting and

⁶⁹ The elusive terminology has a long history of attempted definition, some of which can be found in A. Blombach, 'Phrase and Cadence: A Study of Terminology and Definition', *Journal of Music Theory Pedagogy*, 1 (1987), 225–51; Leonard G. Ratner, *Classic Music: Expression, Form, and Style* (New York: Schirmer, 1980); Caplin, *Classical Form: A Theory of Formal Functions for the Instrumental Music of Haydn, Mozart and Beethoven* (New York: Oxford University Press, 1998); Caplin, 'The Classical Cadence: Conceptions and Misconceptions'.

⁷⁰ David R. W. Sears, Marcus T. Pearce, and others, 'Simulating Melodic and Harmonic Expectations for Tonal Cadences Using Probabilistic Models', *Journal of New Music Research*, 47.1 (2018), 29–52.

⁷¹ See Sears and others, 49.

⁷² Elizabeth West Marvin and Alexander Brinkman, 'The Effect of Modulation and Formal Manipulation on Perception of Tonic Closure by Expert Listeners', *Music Perception: An Interdisciplinary Journal*, 16.4 (1999), 389–407 <<https://doi.org/10.2307/40285801>>.

ending keys and assessing whether the music remains in the tonic. They found that musically trained individuals could distinguish modulating extracts from those which did not, and that there were no significant differences between academics and other musicians. It is interesting to note, however, that mid-piece modulation has the potential to disorient listeners' harmonic compass: although listeners could recognise that such an extract ended in the tonic, they were not able to confirm whether it was the same tonic as the beginning. As Marvin and Brinkman speculate, this could perhaps be attributed to memory issue, i.e. that participants simply could not remember the starting tonic long enough in order to compare it with the closing key. Marvin and Brinkman's study thus raises two critical questions for those wishing to understand the process by which humans understand and process musical syntax: whether we can identify original tonic key, and whether we can remember it long enough to make an informed impression of the final cadence.

In areas relating to structural clarity, researchers have deployed reconstruction as well as Schenkerian reductions to measure participants' awareness of musical architecture. A notable example of such a study is that of Mary Serafine, Noah Glassman and Cornell Overbeeke: consisting of six experiments, this study aims to discover awareness of hierarchic structure by asking participants to match excerpts by Bach to their Schenkerian reductions, as well as assign a similarity rating to each pair.⁷³ Hidden among the reduction options are a few foils which are slightly modified and therefore not true to the original model. For these experiments, which simultaneously test awareness of harmonic and surface structures, Serafine et al. divided their participants based on their musical training profile: no training, 1-4 years, 5-9 years and 10 or more. The six experiments revealed the following trends: firstly, training level is proportional to success rate; secondly, the role of repeated hearing in structural hearing remains ambiguous; and finally, despite the presence of various foils,

⁷³Mary Louise Serafine, Noah Glassman, and Cornell Overbeeke, 'The Cognitive Reality of Hierarchic Structure in Music', *Music Perception: An Interdisciplinary Journal*, 6.4 (1989), 397–430 <<https://doi.org/10.2307/40285440>>.

subjects were largely able to identify the right harmonic and structural reductions. Although the final finding seems to be highly suggestive of the fact that listeners have the inner potential to recognise the inner logic of Western repertoire – with this ability compounded given the right training – the use of reduction model in this paper does complicate the finding. Serafine et al. acknowledge that 'the reduction of a piece of music should reflect the whole piece [and not just a fragment of it]. We have no way of countering this criticism except to say that there is no way of experimentally investigating the distinction between structure and surface without forcing . . . an artificial separation of counterpoint and harmony.'⁷⁴

In order to carry out a productive study in the realm of harmonic and structural awareness, therefore, I believe it is crucial that scholars of cognitive psychology and music theory and analysis engage in a conversation. A model of such an interaction can be found in Roni Granot and Nori Jacoby's set of two studies on which this dissertation is based.⁷⁵ Granot and Jacoby's musical puzzles take the typical textbook definition of sonata form as the basis for segmenting Mozart and Haydn sonatas into eight pieces which participants had to reorder in the most logical way possible.⁷⁶ This puzzle exercise inevitably introduces artificiality into the activity of listening – there is arguably no way of examining musical listening in its purest form – but the outcome of this experiment can be seen as an index that measures formal awareness.

⁷⁴Serafine, Glassman, and Overbeeke, 416-17.

⁷⁵Roni Y. Granot and Nori Jacoby, 'Musically Puzzling I: Sensitivity to Overall Structure in the Sonata Form?', *Musicae Scientiae*, 15.3 (2011), 365–86 <<https://doi.org/10.1177/1029864911409508>>; Roni Y. Granot and Nori Jacoby, 'Musically Puzzling II: Sensitivity to Overall Structure in a Haydn E-Minor Sonata', *Musicae Scientiae*, 16.1 (2012), 67–80 <<https://doi.org/10.1177/1029864911423146>>.

⁷⁶By 'the typical textbook definition of sonata form,' I refer to the pre-Sonata Theory understanding of the model: exposition (divided into main theme, transition and second theme), development, recapitulation, with or without a coda or a codetta – with no reference whatsoever to the technicalities associated with Hepokoski and Darcy's model. See Charles Rosen, *The Classical Style: Haydn, Mozart, Beethoven* (London: Faber and Faber, 1997). The general sonata principle itself is traceable to Edward Cone, who first coined the terminology in 1968; see Edward T. Cone, *Musical Form and Musical Performance* (New York: Norton, 1968), 77.

Table 1 Granot and Jacoby's ten-part segmentation

Exposition	Primary theme
	Transition
	Secondary theme
	Closing
Development	Development
	Retransition
Recapitulation	Primary theme
	Transition
	Secondary theme
	Closing

In many ways, Granot and Jacoby manages to address the issues I identified above: their puzzles involved human participants, put cadence and segments into context despite their randomised order of appearance, and do not have to resort to structural reduction to test hierarchical perception of the sonata structure. In segmenting these pieces into eight sizeable time spans, however, Granot and Jacoby fail to take note of 'New *Formenlehre*' which could have helped them bring out the various sub-levels which exist in any particular segment. This, in turn, would arguably enable a better understanding at the perception of Classical syntax, which in fact influences sonata construction at local and global levels.

1.3 Bridging the knowledge gaps: using intra-thematic division to segment puzzles

The table below illustrates a possible sub-division of the three main chunks from the exposition; the subdivision itself is based on Caplin's formulation and assumes that the two sonata themes are sentential for example purposes.

Table 2 Possible sub-division for Granot and Jacoby's puzzle studies

Main theme	Presentation
	Continuation
	Cadential
Transition	Sequence
	Fragmentation
	Cadential
	Arrival on dominant (pause)
Second theme	Presentation
	Continuation
	Cadential
Conclusion	Post-cadential
	Codetta

Further subdivision of the main sonata episodes has the potential to test awareness of the following technical features:

1) Initial tonic

Inasmuch as experiment subjects have to identify the primary theme (P-theme) from the myriad of themes available – be they those that modulate, complete and incomplete phrases – it is likely that we can prove the ability to recognise initial tonic key.

2) Tight-knit and loose nature of themes

In form-functional theory, it is stipulated that P-theme is more tightly knit than S-theme. Sonata puzzle that is segmented in a more detailed fashion will reveal whether listeners do indeed hear P-theme as tight-knit construction. To the best of this author's knowledge, no other cognitive experiment has attempted to scrutinise this argument.

Caplin himself has lamented that 'the concept of tight-knit versus loose has yet to be as influential on current analytical practice as I believe is warranted.'⁷⁷

3) Contextual nature of cadence and formal function

Caplin's work on cadence emphasises the importance of understanding cadence functionally – contextually, in other words. This has been proven by Bigand et al. in a study which explores cadential expectations: 'target chords were more accurately and quickly processed when they were harmonically related to the previous context.'⁷⁸ In a similar fashion, the schematic nature of formal function could also be empirically tested by investigating participants' ability to relate one function to the next in a particular context. Positive findings on these fronts would support the notion that anticipatory processing underlies musical expectation.⁷⁹

4) Global- and/versus local-level processing of music

Whether listeners process music globally or locally has remained a contentious topic for debate among scholars for the past 60 years. The importance of higher level structure in music cognition was highlighted by Leonard Meyer as well as by Fred Lerdahl and Ray Jackendoff.⁸⁰ This notion, however, has been rebutted by several experiments which prove that listeners tend to process local musical features only.⁸¹

⁷⁷Caplin, 'What Are Formal Functions?', 37.

⁷⁸ Target chords refer to the final two chords in the cadential excerpts used. See Emmanuel Bigand and others, 'Effect of Global Structure and Temporal Organization on Chord Processing', *Journal of Experimental Psychology: Learning, Memory, and Cognition*, 25.1 (1999), 184–97.

⁷⁹ See Jamshed J. Bharucha and Keiko Stoeckig, 'Priming of Chords: Spreading Activation or Overlapping Frequency Spectra?', *Perception & Psychophysics*, 41.6 (1987), 519–24
<<https://doi.org/10.3758/BF03210486>>; Bharucha, 'Tonality and Expectation', in *Musical Perceptions*, ed. by R. Aiello and John A. Sloboda (New York: Oxford University Press, 1994), pp. 213–39.

⁸⁰Leonard Meyer, *Emotion and Meaning in Music* (Chicago: University of Chicago Press, 1956); Leonard B. Meyer, *Explaining Music: Essays and Explorations* (University of California Press, 1973); Fred Lerdahl and Ray Jackendoff, *A Generative Theory of Tonal Music*. (Cambridge, Mass.: MIT Press, 1983).

⁸¹ See Cook, 'The Perception of Large-Scale Tonal Closure'; Narmour, *The Analysis and Cognition of Basic Melodic Structures: Implication-Realization Model* (Chicago: University of Chicago Press, 1990); Narmour, 'The "Genetic" Code of Melody: Cognitive Structures Generated by the Implication-Realization Model',

As has been outlined by Bigand et al. in their cadential study, however, 'global context effects result primarily from activations accumulated in the system . . . expectancy [is also] derived at high and intermediate levels of musical structure: Stronger activations were observed when the target chord was expected at both high and intermediate levels.'⁸²

The above procedure has the potential to address the four issues previously identified in this paper, namely:

1. The lack of theoretical underpinning in segmentation process;
2. Reliance on mechanical simulation to test cadential perception;
3. Whether perception of original tonic is a phenomenon that is evident in listening process; and
4. The role played by memory in comprehending musical structure.

Intra-segmentation of this kind also allows us to delve deeper into the piece in question, to get to know the intricacies of the individual musical work instead of simply attempting to address broader issues relating to listener's ability to comprehend and reconstruct sonata form. This approach in fact addresses one of the contentious points which surround the gap between psychological and musicological research fields, namely the problem of 'The absent work'. Coined by Clarke, this is elaborated as the lack of preoccupation psychologists has with individual musical pieces: ' There is some research that

Contemporary Music Review, 4 (1989), 45–64; E. Glenn Schellenberg, 'Expectation in Music: Investigation of Melodic and Harmonic Processes', *Cognition*, 58 (1995), 75–125.

⁸²Bigand and others, 195.

has made use of an individual work as its subject matter . . . but in virtually every case this is only to provide a focus, or the material, for an investigation of *more general matters*.⁸³

This, of course, can be seen as the inevitable result of methodological reductionism, which many see as 'the most parsimonious way of framing a complex problem in experimentally tractable terms as part of the process of science'.⁸⁴ As Ian Cross and Elizabeth Tolbert have pointed out, however, such a reductionist approach overlooks the fact that music 'incorporates features that may be generic and manifested cross-culturally as well as features that are wholly culturally contingent'.⁸⁵ The use of intra-thematic segmentation in this reconstruction study has the potential to address this issue as it incorporates both empirical and cultural elements in its approach: on one hand, the theory-based puzzle takes into account the individuality of the piece used and lends the study a falsifiable framework; on the other hand, the reconstruction process encourages participants to use not only their explicit knowledge but also their innate musicality, which, as Cross and Tolbert have pointed out, is culturally contingent.⁸⁶

1.4 Analytical tools

This section is divided into two parts, each of which examines the interaction of the main theory under scrutiny, Caplin's form-functional theory, with a related approach: the first deals

⁸³Clarke, 3-4 (my emphasis). Other studies which have made use of specific pieces cited by Clarke include Clarke, 'Some Aspects of Rhythm and Expression in Performances of Erik Satie's "Gnossienne No. 5"', *Music Perception: An Interdisciplinary Journal*, 2 (1985), 299–328; C. L. Krumhansl and M. A. Schmuckler, 'The Petroushka Chord: A Perceptual Investigation', *Music Perception: An Interdisciplinary Journal*, 4 (1987), 153–84.

⁸⁴Ian Cross and Elizabeth Tolbert, 'Epistemologies', in *The Oxford Handbook of Western Music and Philosophy* (Oxford: Oxford University Press, 2020), pp. 265–82 <<https://doi.org/10.1093/oxfordhb/9780199367313.013.14>>, 275.

⁸⁵Cross and Tolbert, 'Epistemologies', 277.

⁸⁶It is unfortunately beyond the scope of this study to delve deeper into the cultural contingency aspect of exploring analysis in real-time. Future research should consider the issues brought up in Ian Cross, 'Music Analysis and Music Perception', *Music Analysis*, 17.1 (1998), 3–20 <<https://doi.org/10.2307/854368>>.

with Sonata Theory and form-functional theory; and the second considers *A Generative Theory of Tonal Music* (GTTM) and form-functional theory.

1.4.1 Sonata Theory versus form-functional theory

This project is reliant on what are arguably the two most significant formal theories of the 21st-century: Hepokoski and Darcy's Sonata Theory, and Caplin's form-functional theory. Such is their influence that scholars have bestowed the term 'New *Formenlehre*' on them.⁸⁷ Despite having a common focus on the practices observed in Austro-Germanic repertoire of the eighteenth-century, on which most of their theoretical claims are based, the two camps differ greatly in their starting points. Since this dissertation investigates the extent to which theoretical claims and principles are perceptible in real-time listening, I do not simply compare the these theories' strong and weak points, but also address the following questions:

1. How compatible are Sonata Theory and form-functional theory when used together?
2. Are there any basic assumptions regarding the kind of listening required to attend to the claims made in these theories?
3. Do they contain assumptions that may be bolstered or challenged should syntactical perception turn out to be innate in listeners no matter their expertise? At this stage, this question cannot be discussed in more than a hypothetical setting – the concluding chapter will explore this in greater depth.

⁸⁷ First coined by Nicholas Marston in his review of 'Classical Form: A Theory of Formal Functions for the Instrumental Music of Haydn, Mozart, and Beethoven by William E. Caplin.', *Music Analysis*, 20.1 (2001), 143–49. The terminology has also been used by Matthew Riley in Riley, 'Hermeneutics and the New *Formenlehre*: An Interpretation of Haydn's "Oxford" Symphony, First Movement"', *Eighteenth-Century Music*, 7.2 (2010), 199–219 <<https://doi.org/10.1017/S1478570610000047>>, and Nathan John Martin in Martin, 'Larsen's Legacy: The Three-Part Exposition and the New *Formenlehre*', *Online Journal of Haydn Society of North America*, 4.2 (2014) <<https://www.rit.edu/affiliate/haydn/sites/rit.edu.affiliate.haydn/files/martin.larsenslegacyabstract.pdf>> [accessed 10 March 2019].

1.4.1.1 Compatibility: top-down versus bottom-up⁸⁸

For Hepokoski and Darcy, sonata form is a scheme that exists as a regulator of Classical norms; any departure from said rules constitutes a deformation. As they like to put it: 'to call a work a sonata is to conclude that . . . it does indeed invite us . . . to use our generic conception of a sonata as the regulative principle of interpretation by which to understand its events.'⁸⁹ Caplin, on the other hand, defines his understanding as follows: 'I see classical form arising out of a common set of formal functions, which are deployed in different ways to create multiple formal types. The common element is not sonata form per se, but rather the functions that make up the various forms.'⁹⁰ In short, Hepokoski and Darcy plump for a top-down view whilst Caplin adopts a bottom-up perspective.

Questions might indeed arise out of the fact that this project deploys two seemingly incompatible premise. I am not trying to gloss over their differences; rather, I attempt to show the ways in which Sonata Theory and form-functional theory, if used collaboratively, may yield a richer understanding of the Classical repertoire. My initial analytical approach in this project (Chapter 2) will primarily be formal function-based, then proceeding to place findings in context using principles of Sonata Theory. As Hepokoski himself has admitted, 'neither side is likely to obtain a theoretical monopoly that bars attention to what the other side is saying. [Rather, they in combination] provide us with different sets of analytical tools appropriate for addressing often different types of analytical questions.'⁹¹

I hypothesise that the bottom-up function preferred by Caplin will prove to be more closely related to the way in which most participants listen. It attends to musical elements at lower levels of perception, which has been shown by psychologists to be the more common

⁸⁸ The terms 'top-down' and 'bottom-up' were first coined by Markus Neuwirth in Markus Neuwirth, 'Joseph Haydn's "Witty" Play on Hepokoski and Darcy's Elements of Sonata Theory', *Zeitschrift Der Gesellschaft Für Musiktheorie*, 8.i (2011), 199–220.

⁸⁹ Hepokoski and Darcy.

⁹⁰ Caplin, 'What are Formal Functions?', 32.

⁹¹ Hepokoski, 'Sonata Theory, Secondary Themes and Continuous Expositions: Dialogues with Form-Functional Theory', *Music Analysis*, 35.1 (2016), 44–73, 45.

approach. Sonata Theory's guiding principles are more likely to be known to candidates of higher expertise, who have undergone formal training and are therefore familiar with the musical forms.

1.4.1.2 Composer-listener duo

Hepokoski has noted that 'perceptions of form are as much a collaborative enterprise of the listener or analyst as they are of the composer.'⁹² This ties in perfectly with Caplin's emphasis on musical temporality, inasmuch as formal perception requires one to undergo the experience that is the unfolding of music in real-time: in listening to a piece of music, the listener himself therefore becomes a part of the composition.

Both theories also agree that such a collaborative enterprise naturally requires an understanding of the rules and norms which govern not just the era from where the music originates, but also the period in which the listener is currently situated. As Hepokoski puts it,

grasping the full range of an implicit musical form is most essentially a task of reconstructing a processual dialogue between any individual work (or section thereof) and the charged network of generic norms, guidelines, possibilities, expectations, and limits provided by the implied genre at hand. This is 'dialogic form'.⁹³

In his response to Hepokoski's essay in *Musical Form, Forms & Formenlehre*, Caplin expresses his agreement regarding the dialogic concept as follows:

Indeed, I am sympathetic to Hepokoski's dialogic approach and believe that my own analyses largely follow the spirit of that enterprise. Seeing as my theory of formal functions is based on

⁹²Hepokoski, 'Sonata Theory and Dialogic Form', in *Musical Form, Forms & Formenlehre: Three Methodological Perspectives*, ed. by Pieter Bergé (Leuven: Leuven University Press, 2010), pp. 71–89, 71.

⁹³Hepokoski, 'Sonata Theory, Secondary Themes and Continuous Exposition', 71.

a wide-spread empirical study of a restricted musical repertory . . . the formal categories that I identify effectively embody [the dialogic criteria set out by Hepokoski above].⁹⁴

The premises of genre familiarity and contextual understanding are the main issues that this dissertation seeks to investigate. Hepokoski, Darcy and Caplin rightly observe that contextual understanding is necessary to grasp 'the full range' of musical form and functions. Without genre familiarity or the necessary contextual knowledge, however, how much of the music's ontology can we grasp? If syntactical perception is an innate part of the human faculty, then perhaps dialogic form in its most nascent stage has always been present. It is only when we set out to grasp 'the full range of the implicit musical form' that we need to sharpen our cognitive tools by acquainting ourselves with the relevant literature and repertoire. To that extent, it would be reasonable at this stage to hypothesise, again, that Caplin's step-by-step and bottom-up approach to musical analysis is the more approachable and relatable theory in this study. In fact, I am going to go so far as to argue that the innate model of perception is in fact the model proposed by Caplin.

1.4.1.3 Is logical *Formenlehre* useful?

Caplin's extremely logical *Formenlehre* is not without its downside. The rigorous, almost step-by-step method with which this theory works – for example, 'once the first V: PAC in the exposition is located, the analyst seeks evidence of the subordinate theme (or subordinate-theme function) that preceded it'⁹⁵ – could arguably subject the analyst to a prescribed methodology despite Caplin's caution to use his guideline flexibly. This would effectively form a straitjacket of a kind. Taking the quoted line by way of illustration: automatically

⁹⁴Caplin, 'Comments on James Hepokoski's Essay "Sonata Theory and Dialogic Form"', in *Musical Form, Forms & Formenlehre: Three Methodological Perspectives*, ed. by Pieter Bergé (Leuven: Leuven University Press, 2010), pp. 90–95, 90.

⁹⁵Hepokoski, 'Sonata Theory, Secondary Themes and Continuous Expositions: Dialogues with Form-Functional Theory', 59.

assuming that the first V: PAC encountered in a piece equals subordinate-theme function is analytically limiting.

A more productive approach towards form-functional theory, then, is perhaps to focus on what is there rather than what is not; to my mind, this is the idea behind privileging function over type.⁹⁶ This approach is congruent with the aims of this project: it would be impossible to test the perceptibility of theoretical claims if we were to assume that predictions regarding musical trajectory could be made, which is why the puzzle pieces in this study are detached from context and have to be considered individually.

Michael Spitzer has criticised Caplin's conception of musical function for already being 'freighted with immanent syntactic obligations in addition to being correlated with contemporary theatrical scenarios.'⁹⁷ Taking the example of sonata development, Robert Hatten argues that

development material, characterised by aperiodicity, instability, greater complexity of design as well as atypicality, is marked with respect to closural material. To speak in such terms is already to recognise that these values are congruent with, dependent upon and in part originate from the basic Classical formal scheme of 'statement – elaboration – closure'.⁹⁸

To speak of something, in short, is to perform an analysis. We can take this a step further (or a step back) to have the following: to make an observation is to recognise values congruent with conceptual ideas → for musicologists, this means evoking the idea of music theory → for non-musicologists, the ability to recognise that unstable passages belong in the middle rather than the beginning signifies an innate understanding of the Classical scheme

⁹⁶ See Caplin, 'What Are Formal Functions?', 31-32.

⁹⁷ Michael Spitzer, 'The Retransition as Sign: Listener-Orientated Approaches to Tonal Closure in Haydn's Sonata-Form Movements', *Journal of the Royal Musical Association*, 121.1 (1996), 11–45 <<https://doi.org/10.1093/jrma/121.1.11>>.

⁹⁸ Robert Hatten, *Musical Meaning in Beethoven: Markedness, Correlation, and Interpretation* (Bloomington: Indiana University Press, 1994), 119.

that is not dependent on formal training. Caplin's theory, then, may well constitute a reflection of innate perception. It is perception theorised, in other words.

1.4.2 Generative Theory of Tonal Music (GTTM) and Form-functional Theory

Caplin's theory is, of course, preceded by Frank Lerdahl and Ray Jackendoff's influential *Generative Theory of Tonal Music* (GTTM), one of the landmarks in the study of music cognition. Building on Gestalt psychology and Leonard Bernstein's Charles Eliot Norton Lectures at Harvard in 1973, which looked into the idea of musical grammar modelled after Noam Chomsky's thoughts on linguistics,⁹⁹ Lerdahl and Jackendoff's work has been greatly influential to those studying issues surrounding aural processes of music perception. In many ways, my starting point is similar to that of GTTM, namely the shared fascination over those elements that combine to make a particular piece of music what it is.¹⁰⁰ GTTM's main concerns are 'identifying the factors relevant to establishing musical intuition and learning how these factors interact to produce the richness of musical perception'.¹⁰¹ This echoes the sentiments expressed in my research questions.

A closer comparison between my analytical tool of choice – Caplin's form-functional theory – and GTTM yields several inherent differences in perspective.

1.4.2.1 Top-down versus bottom-up

As is the case with Sonata Theory, perhaps the most obvious difference between the two schools of thought is GTTM's top-down and form-functional theory's bottom-up approaches. The top-down approach favoured by GTTM is problematic in cases where two parameters

⁹⁹ For example, see Chomsky, *Syntactic Structures* (The Hague: Mouton, 1957); Chomsky, *Aspects of the Theory of Syntax* (Cambridge, Mass.: MIT Press, 1965); Chomsky and Morris Halle, *The Sound Pattern of English* (New York: Harper & Row, 1968).

¹⁰⁰ Some of the GTTM principles are very closely related to Caplin's own in form-functional theory, such as the sixth Time-Span Reduction Preference Rule (TSRPR 6) concerning prolongational stability, which is very much related to Caplin's idea on stability as being one of the anchoring characteristics of an opening theme: 'In choosing the head of a time-span *T*, prefer a choice that results in more stable choice of prolongational reduction.' See Lerdahl and Jackendoff, *A Generative Theory*.

¹⁰¹ Lerdahl and Jackendoff, *A Generative Theory*, 54.

collide, such as discussed in Chapter 8 on branching: 'The factors determining right or left branching may, of course, conflict with one another – as, for instance, when melodic and harmonic influences are in opposition.'¹⁰² When considering a musical episode, therefore, it is perhaps more helpful to view its initial function first, before deciding its role in a larger scale. Using this approach would mean that when such ambiguity arises, the problematic episode will be taken into account as a whole, i.e. not solely according to its melodic or harmonic make-up. In turn, this means that any grouping or analytic decision will not privilege an element at the expense of another – the episode is left intact, and the analysis arguably a lot fairer. A mechanistic 'right or left' approach will potentially hinder this holistic, bird's-eye view of the music, which will result in a less elegant perspective.

1.4.2.2 The issue of expertise and flexibility

For Lerdahl and Jackendoff, 'the goal of a theory of music [is] to be a *formal description of the musical intuitions of a listener who is experienced in a musical idiom*.'¹⁰³ A listener who is experienced in an idiom is of course bound to listen differently to the un-initiated. My hypothesis, however, is that properties inherent in musical syntax – in particular, Classical syntax per the Caplinian school of thought – are audible to all, experts and amateurs alike: they are conceptual properties that can be perceived by anyone, and not merely external factors interred in the music (or as Lerdahl and Jackendoff put it: 'Insofar as one wishes to ascribe some sort of "reality" to these kinds of structure, one must ultimately treat them as mental products imposed on or inferred from the physical signal.'¹⁰⁴)

GTTM's main concern quoted above, i.e. to identify 'factors relevant to establishing musical intuition,' can, to a large extent, be seen in Caplin's work on formal functions.

Regardless of their aural perceptibility, formal functions exist as inherent properties of music

¹⁰²Lerdahl and Jackendoff, *A Generative Theory*, 187.

¹⁰³Lerdahl and Jackendoff, *A Generative Theory*, 1, original italics.

¹⁰⁴Lerdahl and Jackendoff, *A Generative Theory*, 2.

(or at least, a particular repertoire within the Western music history); they are a separate concept with its own existence. Lerdahl and Jackendoff argue that their study 'will justify the view that a piece of music is a mentally constructed entity, of which scores and performances are partial representations by [which] the piece is transmitted.'¹⁰⁵ There is no disputing the fact that music does not exist in one particular medium only – its very nature enables it to assume various modes of existence without changing itself. There is also no denying that 'music is a product of human activity.'¹⁰⁶ The stimuli with which we engage may have been inscribed into the music by the composer, but regardless of their perceptibility, they exist. The author believes that music in the repertoire specified earlier assumes a non-spatial existence and occupies its own space, notwithstanding human response to it – the repertoire and its building blocks are not simply mental constructs, and they exist regardless of the current state of social interaction. I aim to test the hypothesis that the capacity to recognise this conceptual entity is present in listeners, and through the mediation of music theory and analysis, can be made more relatable to and meaningfully comprehended by listeners, regardless of their background and expertise.

1.4.2.3 Musical grammar book: whose method is more effective?

GTTM builds on Chomsky's work on generative-transformational grammar, which is an attempt to characterise what we know and how we process that knowledge when speaking a language; in turn, the processes of characterising and processing said knowledge result in our ability to create and understand limitless possibilities out of a certain number of options, giving rise to complex sentences and meanings. This unconscious knowledge is what is called 'a *grammar*, which describes (or "generates") the possible sentences of the language.'¹⁰⁷ This

¹⁰⁵Lerdahl and Jackendoff, *A Generative Theory*, 3; contrast this with Lerdahl's claims in his 'Cognitive Constraints on Compositional Systems', *Contemporary Music Review*, 6.2 (1992), 97–121 <<https://doi.org/10.1080/07494469200640161>>.

¹⁰⁶Lerdahl and Jackendoff, *A Generative Theory*, 2.

¹⁰⁷Lerdahl and Jackendoff, *A Generative Theory*, 5, italics original.

stance is very similar to that taken by Caplin in his form-functional theory: functional properties can be harnessed and organised in many different ways, in orthodox or unconventional manners, to generate an indefinite number of musical pieces – our idiomatic understanding of the nature of each function will help us make sense of these combinations, i.e. a kind of guidebook.

Like form-functional theory, GTTM lays out a very thorough set of ground rules for generating analyses on cognitive processes. Approaches in GTTM are primarily centred on rhythmic and metrical grouping, as well as time-span reduction. The two rules in governing the theory are well-formedness and preference rules, with the first specifying 'the possible structural descriptions,' and the second designating 'out of the possible structural descriptions those that correspond to experienced listeners' hearings of any particular piece.'¹⁰⁸ As mentioned above, GTTM share plenty of similarities with Caplin's form-functional theory.

Lerdahl and Jackendoff argue that in producing time-span branches, 'not only can branches not cross, but a sequence of events at any level must be exhaustively analyzed', which can prohibit one from analysing events that do not receive branches.¹⁰⁹ This is part of the dictum that is Prolongational Reduction Well-Formedness Rules (PRWFR) 4 (No Crossing Branches): 'If an event e_i is a direct elaboration of an event e_j , every event between e_i and e_j must be a direct elaboration of either or some event between them.'¹¹⁰ There are, however, times when this rigidity cannot be fruitfully applied – I have in mind instances that exhibit signs of 'becoming.' At such times, attempts to draw tree diagrams, the likes of which are advocated in GTTM, will arguably not be a sophisticated enough model that can display the intricacy at play in the music. With its emphasis on functional identification, however, form-functional theory is capable not only of characterising and describing the event in

¹⁰⁸Lerdahl and Jackendoff, *A Generative Theory*, 9.

¹⁰⁹Lerdahl and Jackendoff, *A Generative Theory*, 114.

¹¹⁰Lerdahl and Jackendoff, *A Generative Theory*, 215.

question, but also of providing context and enabling a more seamless bird's eye view. In fairness, this is a criticism to which Lerdahl and Jackendoff have responded: 'the sheer geometry of networks creates insuperable notational difficulties once even a moderate number of events are considered together; network notation is simply impracticable for the analysis of real pieces.'¹¹¹ By having just one focus – formal function – that takes into consideration the rhythmic, metric, thematic and harmonic designs of a particular musical instance, we are freed of geometric clutter and prescriptive rules.

1.4.2.4 Music or listener: who comes first?

Form-functional theory is also advantageous in the setting of this PhD because first and foremost, it concerns itself with the music, not listener's intuition or preference. This means that it is possible to account for the concept of 'transformation,' a concept that remains a troubling one in GTTM: 'the problem is *to constrain the admissible relations, to limit the permissible transformations*. Presumably a theory that purports to describe the musical intuitions of *the experienced listener* should be able to treat this matter.'¹¹² There are two important issues in this statement that I wish to expand: firstly, the idea that we should be able to define a clear boundary regarding permissible transformations in a given set of material; and secondly, the idea of catering to the experienced listener.

Caplin creates a taxonomic system that categorises events in the Classical repertoire into three categories: initiation; continuation; and cadential (or in layman's terms: beginning; middle; and end). By combining these functions in a specific manner, we can create a series of musical hierarchies that eventually results in a large-scale structure, such as sonata form. In a similar fashion, GTTM parses music based on its rhythm, metre, and time-span events, a procedure that shows the hierarchical nature of a piece of music; in turn, the diagrammatic process characteristic of GTTM shows us the many layers of perception music induces.

¹¹¹Lerdahl and Jackendoff, *A Generative Theory*, 116.

¹¹²Lerdahl and Jackendoff, *A Generative Theory*, 286, italics mine.

The phrase 'identifying the factors relevant to establishing musical intuition' is, to me at least, rather telling: the emphasis here tends to be to favour listener's intuition instead of the intrinsic nature of each musical building block itself. In other words, GTTM arguably considers first and foremost the intuition, which picks up musical variables and the ways in which these interact with each other. On the other hand, my Caplinian stance favours the musical variables as entities capable of eliciting particular responses from listeners.¹¹³ The focus of the research questions in this thesis means that the music is the point of departure, not the intuition. As I have also argued in the previous section on existing scholarship, we risk obtaining only a partial understanding of musical perception by not prioritising the music itself.

It is precisely because 'music is not tied down to specific meanings and functions, as language is' that GTTM, with its rather restrictive and prescriptive rules, fall short of expectations.¹¹⁴ With its more universal and umbrella approach, which discounts neither the music nor perception (inasmuch as functional qualities are perceptible, i.e. stable or unstable, sequential or not, etc.), form-functional theory allows a more all-encompassing perspective, therefore offering a flexible take on limitless combinations of motives. It is also thanks to this versatility that we can apply functional analysis to studying cognitive processes in all types of listener, regardless of their expertise. As mentioned above, this thesis concerns itself with the audibility of syntax, and one of its central hypotheses is that syntax is perceptible to all, notwithstanding their background and knowledge. Of course, the extent to and the eloquence with which they process and understand syntax are dependent on training and exposure, as well as their own intellectual resources. It is interesting to note that this idea of universality is

¹¹³ Throughout this thesis, references to the innate cognitive faculty of human beings are strictly aimed at those acculturated to the Western system. Nowhere in this thesis do I argue that this applies to every single human being in the world, as I am aware of cultural differences and the fact that music is a very culture- and context-specific art form and experience.

¹¹⁴ Lerdahl and Jackendoff, *A Generative Theory*, 8.

actually posited by Lerdahl and Jackendoff in Chapter 11 of their book, where they suggest that because

the degree that the listener's knowledge is complex and abstract with respect to the musical surface, it becomes more difficult to explain his acquisition of this knowledge on the basis of simple generalization over presented musical surfaces (the 'stimulus generalization' of empiricist psychology). Having developed a grammar of tonal music in considerable detail, we are now in a position to make the argument more pointed. If the rules we have proposed correspond at all closely to principles unconsciously known and used by the experienced listener, one must ask how the listener manages to learn them. And of all the possible organizations one could attribute to tonal music (including all the incorrect ones posited by us music theorists), *why does the listener infer the ones he does?* The only answer that we find defensible is that *one does not have to learn the entire grammar from scratch*. Rather, one has no choice about much of it; *many aspects of the grammar are simply the only (or easiest) ways that one's mental abilities make available for organizing a musical signal*. In other words, much of the complexity of *musical intuition is not learned, but is given by the inherent organization of the mind, itself determined by the human genetic inheritance*.¹¹⁵

Clearly, despite advocating quite a mechanistic approach to musical analysis, GTTM recognises the innateness of logical faculty in listeners.¹¹⁶ Lerdahl and Jackendoff also go on to add that 'those parts of the grammar that are especially remote from the surface evidence are strong candidates' for evidence regarding innateness. Referring to harmonic prolongation as an example, they claim that it is 'unlikely . . . that one could infer from a number of unanalyzed musical surfaces' the presence of prolongation; 'thus on grounds of learnability

¹¹⁵Lerdahl and Jackendoff, *A Generative Theory*, 281, italics mine.

¹¹⁶ 'We have repeatedly emphasized that the analytic structures we postulate are not confined to experienced listeners. Even the most naive listeners undoubtedly hear music as grouped; and they know where to tap their feet in time to the music . . . Moreover, our impression of children's errors in singing songs and of regional variants of folk songs is that they reveal intuitions of reductional structure.' See Lerdahl and Jackendoff, 331.

we would argue that the presence of such a [phenomenon] represents a contribution of innate musical capacity, even if some particular rules must be learned.¹¹⁷

Lerdahl and Jackendoff also argue that 'innateness appeals to the existence of universals of musical grammar . . . they reflect cognitive similarities among all listeners – innate aspects of mind that transcend particular cultures or historical periods.'¹¹⁸ Whilst there are some truths in this statement, this thesis reaches the contrary view. I do not claim that the ability to recognise musical grammar, whatever it may be, is innate, but rather that Caplin's Classical syntax is perceptible, and it so happens that the way our inner faculty is organised renders it partial to this mode of comprehension. Of course,

someone who grants the existence of a musical grammar in the mind of the experienced listener might still deny that it is in part innate. But it is not enough to deny innateness on the basis of methodological preference; it is incumbent on such a critic to explain how all the complexities of musical grammar might otherwise be learned.¹¹⁹

Approaching the issue of cognition from the point of view of form-functional theory simply allows us to see how this innateness can actually be systematically categorised and explained. Without a theoretical starting point, it is safe to say that a thorough investigation into music perception will be near impossible, especially considering the dual nature of music: on one hand, it assumes an inky existence on paper; on the other, it is a process in time, audible but not visible despite giving a sense of space-in-time.

This difficulty is summed up in the final chapter of GTTM, where the authors broach the psychological and linguistic connections their theory has with Gestalt theory. One of the major challenges faced by the Gestalt movement 'arose from the problem of how to couch a mentalistic theory in a rigorous and explanatory fashion . . . The other stumbling block to

¹¹⁷Lerdahl and Jackendoff, *A Generative Theory*, 281-2.

¹¹⁸Lerdahl and Jackendoff, *A Generative Theory*, 282.

¹¹⁹Lerdahl and Jackendoff, *A Generative Theory*, 282. In the context of this citation, I take 'musical grammar' to mean 'Classical syntax' as per my previous argument.

Gestalt theory was a lack of formalism.¹²⁰ This is where form-functional theory proves to be useful: its taxonomic nature is rigorous; and its explanation of formal functions take into account the theoretical as well as the perceptual.

1.5 Hypothesis

The main hypothesis of the project is that musical syntax as found in Classical music is audible to listeners. By extension, the hypothesis also includes the audibility of claims made by formal theories, i.e. theoretical claims are not restricted to paper, but reflect and bear direct relevance to listening processes.

The four sub-sections below will cover in greater depth hypotheses relating to the perceptibility of syntax, the relationships between expertise, duration of puzzle completion, pitching ability, and accuracy, and the link between intuition and/or training and harmonic perception.

1.5.1 Perceptibility of syntax

Syntax is likely to be perceptible, and listeners, no matter their expertise, can at the very least distinguish between the three main temporal criteria in music: beginning, middle and end. Just to what extent they can do so remains a grey area that will be explored in the course of this thesis. It is reasonable, however, to presume at this stage that those with a higher level of formal training will be able to recognise formal functions more accurately and organise them more elegantly. Very simply put, final-year undergraduates that make up the expert population will be topping the performance chart, followed by first-year undergraduates and non-Music students.

Within the non-Music population, there will undoubtedly be some individuals who have received instrumental tuition. Very few, if any, of such musicians would have gone

¹²⁰Lerdahl and Jackendoff, *A Generative Theory*, 305-6.

beyond Grade 8. Considering that graded examinations form a major part of the common music lesson, it is reasonable to expect that the focus of learning for these individuals would have been not so much on theoretical and formal understanding but on practical skills that will ensure examination success. This means that the level of syntactical understanding displayed by such participants will likely be rather rudimentary.

As in Granot and Jacoby's two puzzle studies, participants in this experiment will also be tasked with reconstructing the original versions. Results will initially be assessed using two general criteria: sequential and functional accuracies. Sequential accuracy is concerned with the degree to which an answer matches the original, whereas functional accuracy the extent to which a formal function implied by the content of a puzzle segment is correctly interpreted and organised in relation to its surroundings: for example, placing an initiatory function at the start of a phrase or a section would constitute a functionally accurate reading.

1.5.2 Duration and accuracy

Duration of completion does not correlate to accuracy but may likely be inversely related to level of expertise. It is reasonable to predict that the more formal training a participant has under his belt, the quicker he will be in solving the puzzles: he will likely be able to recognise and parse the clips in a shorter time than his less-expert counterparts, and this will likely result in a shorter completion time. Being quick, however, does not necessarily translate to accuracy. Considering the level of difficulty posed by the three experiments, it is reasonable to suspect that participants, regardless of expertise, may give up midway. Music students may persevere for longer than non-Music subjects simply because they perceive this to be a reflection of their ability as musicians; in other words, their performance in this study is a mirror of sorts that allows them to see their academic progress, therefore pressuring them to excel in order to prove themselves. Precisely because of this performance anxiety, it is also

reasonable to consider the possibility that non-Music participants could spend the least time in this experiment, whilst Music students the longest.

With regards to duration, then, there are two yardsticks by which we can measure performance in the experiment: the first is from the perspective of expertise, and the second motivation. The two factors are related paradoxically, which anticipates the nature of this type of inter-disciplinary study: there will remain a degree of subjectivity and ambiguity that cannot be eliminated, which means that no one conclusion is ever fully indisputable. Then again, this is perhaps to be expected as 'music is not simply a barren artifact but is both created by and for listeners. [In this sense, the study of music] can (and maybe should) include the study of what it means to be human.'¹²¹

1.5.3 Pitching ability and accuracy

The lack of visual signpost in this experiment means that subjects have to rely solely on their sense of hearing. In this respect, one's pitching ability will more likely than not provide an advantageous head start, both with regard to melodic and harmonic processing. There is, however, a caveat: inasmuch as this experiment targets logical syntactical organisation, simply being able to pitch and organise based on harmonic shades will not suffice – the ability to group clips in the same key (a local feature) has to be combined with the foresight to create an overall harmonic blueprint that is coherent (a global feature). With this in mind, it is reasonable to suppose that good pitching skill is not a hugely determining factor in measuring success. Pitching skill cannot be considered on its own when analysing anything above local grouping – factors such as methodology, training and logical power suggested in candidate's working will have to be taken into account.

¹²¹'The Future of Theory', 106.

1.5.4 Grouping and recognition of sonata area

Being able to group local-level entities, such as main themes, their repetitions and variations, is a trait that will likely be apparent in results to be collected. Grouping similar materials together, even if only in the most basic sense, will confirm findings from previous studies from a functional perspective: the ability to recognise musical similarity is still present even when music is fragmented based on function instead of its natural flow.

Participants should perform much better in thematic grouping in the Mozart puzzle as opposed to the other two regardless of expertise, seeing as Mozartean syntax is the most straightforward; Beethoven and especially Haydn are likely to be the more difficult tasks among the three. Although Beethoven's style in Op. 31 is markedly different from the High Classical style demonstrated in Mozart's K. 283, it is nevertheless still based on principles with which most Classical listeners are familiar. Haydn, on the other hand, is notorious for evading such generalities. The piano sonata chosen for the third experiment offers a particularly apt illustration of Haydn's compositional quirk, with its fragmented rhetoric and lack of clear boundaries, both thematically and formally.

Candidates will likely find it challenging to allocate primary and secondary statuses to the main themes in the Beethoven due to their ambiguous designs: Beethoven's primary theme is fragmentary whereas the second is more solidly built – in other words, the secondary theme has been outfitted with traits more commonly associated with the primary theme, and vice versa. A similar problem can be expected to arise with regards to Mozart's developmental theme: atypical of development material in sonata form, this theme is perfectly symmetrical, as well as being harmonically and thematically stable; the developmental material in K. 283 can therefore be mistaken for either the primary or secondary theme.

Finally, transition materials in all three sonatas may well be misunderstood as constituents of primary or secondary themes. Furthermore, their open-ended, dominant-based ending – the caesura – can be misinterpreted as being part of an extended preparatory dominant, a lead-up generally found in popular music; this is perhaps more pertinent to those without any theoretical background, seeing as Music students would likely be more aware of a typical Classical opening.

1.5.5 Harmonic recognition: training-dependent or intuitive?

The next prediction is that detecting stability in harmony is not a skill that comes from formal training. Distinguishing between the more-stable tonic from the expectant dominant undertone is arguably an instinctive exercise.¹²² It has been shown that 'formal knowledge in music theory [is not required] in order to detect these tonal relationships, as quite young children are sensitive to these tonal hierarchies.'¹²³ A recent study by Andrea Halpern and Clemens Wöllens shows that adults and children with no musical training whatsoever rated melodies with unexpected endings as more poorly constructed than those with expected endings.¹²⁴

A study on inter-generational patterns of musical processing suggests that different generations have different approaches in generating expectations when listening to music: 'While the expectations of the younger listeners are more influenced by specific sequential melodic patterns, those of the older listeners are influenced more by tonal patterns relative to the key.'¹²⁵ This finding contradicts previous findings, which suggests that tonal patterns are

¹²²J. J. Bharucha and C. L. Krumhansl, 'The Representation of Harmonic Structure in Music: Hierarchies of Stability as a Function of Context', *Cognition*, 13 (1983), 63–102; Krumhansl and Shepard.

¹²³ Quoted from Andrea R. Halpern and others, 'That Note Sounds Wrong! Age-Related Effects in Processing of Musical Expectation', *Brain and Cognition*, 113 (2017), 1–9 <<https://doi.org/10.1016/j.bandc.2016.12.006>>, 1; see also Carol L. Krumhansl and Peter W. Jusczyk, 'Infants' Perception of Phrase Structure in Music', *Psychological Science*, 1.1 (1990), 70–73; Sandra E. Trehub, Leigh A. Thorpe, and Laurel J. Trainor, 'Infants' Perception of Good and Bad Melodies', *Psychomusicology: A Journal of Research in Music Cognition*, Music Child Development, 9.1 (1990), 5–19 <<https://doi.org/10.1037/h0094162>>.

¹²⁴ See Halpern and others, 'That Note Sounds Wrong!', 5.

¹²⁵ Halpern and others, 'That Note Sounds Wrong!', 5.

generalised constructs, i.e. schematic in nature and perceived using skills acquired through extensive exposure to the world of Western tonality.¹²⁶

An advantage in investigating syntax in Classical music is its regularity. It can be shown that this music 'naturally extends in time, allowing [a certain set of] expectations to be built up and even tracked over the time course' of a piece.¹²⁷ It has been observed that 'musical listening is nearly universal, that musical styles contain structural regularities, that musical understanding depends on acquiring these regularities through implicit statistical learning and that such understanding may be assessed through expectation.'¹²⁸ The Classical syntax as has been catalogued by Caplin has the advantages of being regular and predictable; consequently, this syntactical practice lends itself naturally to this type of research as it is permutationally feasible.

¹²⁶ See Krumhansl and Jusczyk, 'Infants' Perception of Phrase Structure in Music'.

¹²⁷ Halpern and others, 'That Note Sounds Wrong!', 2.

¹²⁸ Halpern and others, 'That Note Sounds Wrong!', 2.

Chapter 2: Musical analysis

In this chapter, I will be outlining the experimental procedure as well as presenting theory-based analyses of the pieces to be used in the experiment. A hybrid perspective will be adopted throughout the analyses by combining analytical commentary with prediction as to misinterpretations that may arise in the reconstruction process. In this way, I will not only be highlighting unusual form-functional features, but also illustrating the various ways that they can be understood to mean. The analyses in this chapter will lay out the reasoning behind the segmentation process, and at the same time illustrate the hypotheses mentioned in the previous chapter.

The following recordings were used in this project:

- Mozart's K. 280 and K. 283: Complete Sonatas and Variations by Daniel Barenboim, released in 2012 by Warner Classics
- Beethoven's Op. 31 no. 1: Complete Piano Sonatas and Concertos by Alfred Brendel, released in 2010 by Decca Music
- Haydn's Hob. XVI no. 22: Andrew Remillard's 2019 recording on [Youtube](#)

2.1 Pre-experiment considerations

2.1.1 The musical material

The present study is designed to take the form of sonata reconstruction exercise in the Classical style. The first movements from the three sonatas above, bar K. 280, will be analysed and then cut into segments based on intra-thematic consideration. The segments would be numbered randomly, essentially creating disordered puzzles that participants would have to reorder into what they think are the most aurally satisfying versions.

Prior to the reconstruction experiment, participants will be presented with a listening task. This preliminary exercise would serve to equalise the playing field, so to speak, i.e. to impress, however fleetingly, the style being tested in the minds of expert and non-expert participants alike. It effectively acts as a pre-task control variable, and would constitute a typical Mozartean piece in sonata form.

Two works by Mozart were therefore chosen. In selecting these pieces, I had in mind two main considerations: firstly, they must not be overly played sonatas, such as the A major, K. 311, as this would tamper with quality control; and secondly, both must be prototypical sonatas in the Classical style as outlined in Sonata Theory and form-functional theory. In the end, the first movements from Sonata in F, K. 280 and Sonata in G, K. 283, were selected to be the pre-task and puzzle exercises respectively: both are faithful representations of the Classical sonata form in its most fundamental sense, and neither is considered part of the classic Mozart piano playlist. On Youtube, for example, the number of hits for these two sonatas are in the region of tens of thousands or low hundreds of thousands; the more popular Mozart sonatas, such as K. 331, have been played millions of times. The first movement from Beethoven's Op. 31 no. 1 was already in the running from the very beginning – as previously explained in the first chapter, this study is a natural follow-up to a piece of work I have been pursuing for the past six years.

2.1.2 Segmentation process and medium of dissemination

The segmentation process was carried out based on said analyses using ProTools, and the breakdown of the resulting clips can be seen in the appendix. It was impossible to ensure a clean break at the start and end of every clip: the nature of the segmentation logic does not allow convenient splicing, seeing as not every function falls neatly at a cadential pause, for example. Nevertheless, the author has tried her best to minimise such irregularities.

Following the segmentation process, these clips were randomly numbered and uploaded onto a public playlist on Soundcloud, which was chosen on account of its efficiency, both in terms of money and logistics: it was free to use; its online presence meant that participants could access it anywhere and whenever they wanted; and I had no coding resources that could create an interactive platform on which this test could be run. I also created an answer sheet for each puzzle, each of which took the format of a Word document. Each answer sheet consisted of two pages: the first details the instructions and the link to the playlist, and the second a questionnaire which asks participants their age, gender, genres of music they prefer, musical training background, instruments played, and pitching ability (relative or absolute). The answer sheet also asks them to detail strategy used to solve the puzzle.

2.2 Mozart: Sonata in F, K. 280, first movement (pre-task listening exercise)

Written in 1774, this piano sonata in F major is a contemporary of K. 283. The two also share many similar features, making K. 280 a suitable piece for the pre-task listening exercise. As has been discussed in the previous chapter, the pre-task listening exercise is put in place to establish, albeit briefly, the compositional style and rhetoric that form the standards by which syntactical understanding is measured in this study.

The first movement of K. 280 is a typical Classical sonata form – in Sonata Theory terminology: Type 3 sonata – consisting of an exposition, development, and recapitulation that are clearly demarcated. The fanfare-like opening chords in the tonic impress very clearly the tonality of the piece to the listeners; this is further reinforced by the use of tonic pedal throughout the first six bars. The primary theme (P-theme) is designed in what Caplin would call a sentence, starting with a four-bar compound basic idea (CBI): bb. 1-4 the CBI.; bb. 5-6

the continuation based on the downward pattern found in bb. 3-4; and bb. 7-9 the cadential, which is repeated in bb. 10-12. The perfect authentic cadence (PAC) in b. 13, concealed within the flourish, formally concludes the P-space.¹²⁹



Figure 3 Mozart, K.280: P-space, bb. 1-13

We now enter the transition that is loosely based on the P-theme. Here, the opening music is moulded into a series of arpeggiation that goes through various keys. As Caplin would say, such techniques allow the music to achieve the following outcomes, all of which work towards setting a contrasting stage for the secondary theme (S-theme): the destabilisation of the tonic; the loosening of formal organisation; and the liquidation of characteristic motivic material. This culminates in a pause on the dominant in b.26. Hepokoski and Darcy's I: HC MC label is applicable here. The use of the label MC effectively indicates that the S-space is imminent.¹³⁰ Caplin, on the other hand, advocates a less constrictive concept that he simply terms 'dominant arrival'.¹³¹ Mozart's decision to pause on the dominant here is significant, for it implies a certain degree of harmonic ambiguity in

¹²⁹ For a definition of PAC and P-space, see respectively Caplin, *Classical Form: A Theory of Formal Functions for the Instrumental Music of Haydn, Mozart and Beethoven*, 256; Hepokoski and Darcy, *Elements*, 67.

¹³⁰ I have in mind Hepokoski and Darcy's well-known assertion: 'If there is no MC, there is no S,' in Hepokoski and Darcy, 117.

¹³¹ For Caplin, see Caplin, *Analyzing Classical Form: An Approach for the Classroom*, 331-35.

the sonata trajectory. The dominant chord in question depicts 'two harmonic "focal lengths"', raising the potential for either a tonicisation of the dominant or a return to the tonic; Robert Winter has termed this phenomenon 'bifocal close'.¹³²

Immediately after that, the S-theme enters in the dominant. It is lengthier than the P-theme, and is built in a more complex fashion: the two-fold thematic statement is individually a compound basic idea (the bass octaves in bb. 27 and 31 contrast with the three-bar scalar patterns), which is followed with a continuation that starts in b. 35. The ascending chromatic bass line mirrors that found in the transition, and it eventually finds its way to the cadential function starting in b. 40; the EEC that closes the S-space, and by extension, the exposition, can be found in b. 43.



Figure 4 K.280: S-space, bb. 27-43

¹³² See Robert S. Winter, 'The Bifocal Close and the Evolution of the Viennese Classical Style', *Journal of the American Musicological Society*, 42.2 (1989), 275–337 <<https://doi.org/10.2307/831658>>.

After a closing section, we enter the developmental area (b. 57 onwards) that sees Mozart recycling melodic ideas previously encountered in the TR and S-space – the triplets and arpeggio patterns – but treating them in a loosely imitative manner.



Figure 5 K.280: end of exposition and start of development, bb. 55-67

This musical conversation forms the pre-core to the development proper that starts with the ascending bass unison in b. 67.¹³³ Although this is the developmental core, there is no significant modulations or thematic development that takes place in this sonata. Passing modulations are only hinted at, and perhaps the most harmonically adventurous part of this section is the retransition starting in b. 75. Instead of heading towards a typical dominant-based retransition, we find ourselves in submediant territory by b. 78.¹³⁴ Retrospectively, we could say that this move has been foreshadowed from bb. 63-66. This turn effectively 'links the movement's strongest motion toward the tonic with the movement's strongest motion away from the tonic . . . [the modulation] momentarily turns the tonality inside out, so that

¹³³ For definitions of pre-core and core of sonata development, see Caplin, *Classical Form*, 141-42.

¹³⁴ Burstein has explored the tendencies of mid- to late-eighteenth century composers to veer towards remote keys in their retransitions. See his 'Striking Approaches to Galant Recapitulations' (presented at the 9th European Music Analysis Conference, Strasbourg, 2017); and Burstein, *Journeys Through Galant Expositions* (New York: Oxford University Press, 2020) <<https://oxford-universitypressscholarship-com.ezphost.dur.ac.uk/view/10.1093/oso/9780190083991.001.0001/oso-9780190083991>> [accessed 11 February 2021].

the harmonically stable pitches become unstable, and vice versa.¹³⁵ This brief chromatic excursion is a particular highlight in this movement.



Figure 6 K.280: retransition and recapitulation of P-space, bb. 74-87

The chromatic motion effectively replaces the more conventional standing-on-the-dominant that paves the way towards the recapitulation, which takes place in b. 83. The P-space is a replica of its counterpart in the exposition, as is the S-space and postcadential passage. The only difference can be found in the slight contrapuntal writing in the middle of the transition (bb. 101-104) where the reaching-over of the left hand brings to mind the inverted motion at the start of the development. Again, this highlights the simple yet versatile nature of Mozart's materials.

From the perspective of music analysis, the transparency of form in this piece makes the latter suitable as a benchmark for an aural experiment. Taken together, its clear texture, thematic and harmonic plans, as well as its simplicity, arguably do much to minimise distraction and help focus the listening experience on the overall stylistic impression. In other words, rather than having to concentrate on following the unfolding technical processes (as one would when listening to a Bach's fugue, for example, or complex late-Romantic works), listeners are encouraged to direct their attention, subconsciously or consciously, towards

¹³⁵ Burstein, 'Recomposition and Retransition in Beethoven's String Quintet, Op. 4', *The Journal of Musicology*, 23.1 (2006), 62–96 <<https://doi.org/10.1525/jm.2006.23.1.62>>, 70.

stylistic perception, to interact with the characteristics inherent in the melodies, and thus to the syntactical logic that underlies the musical organisation.

2.3 Mozart: Sonata in G, K. 283, first movement

Like the K. 280 we have just encountered, this movement exhibits many properties typical of sonatas from the period. This does not, however, mean that the sonata is a banal creation.

Rosen has pointed out that even with the most run-of-the-mill forms, 'Mozart aims to demonstrate that no one can do it so well'.¹³⁶

The table below details how the movement has been broken into 33 constituent form-functional segments.

Table 3 Mozart, K.283: segmentation

Number	Segment number ¹³⁷	Bar number (beat)	Details
1	14	1 - 4 (2)	P-theme, statement-response
2	16	4 (3) - 7	Continuation
3	22	8 - 10 (2)	Cadential
4	24	10 (3) - 13	Continuation repeated
5	17	14 - 16 (1)	Cadential repeated
6	1	16 (2) - 22	Transition and MC
7	18	23-26	New theme (S-theme, retrospectively) in D major
8	23	27-30 (2)	New theme repeated
9	2	30 (3) - 32	Contrasting idea
10	3	33-34	Continuation based on contrasting idea
11	19	35-37	Cadential but aborted
12	21	38-39	Continuation repeated ('one more time' technique) ¹³⁸

¹³⁶ Rosen, 471 n.8.

¹³⁷ In random and as appears in the puzzle.

¹³⁸ See Janet Schmalfeldt, 'Cadential Processes: The Evaded Cadence and the "One More Time" Technique', *Journal of Musicological Research*, 12.1–2 (1992), 1–52 <<https://doi.org/10.1080/01411899208574658>>.

13	4	40-43 (1)	Cadential with a PAC
14	20	43-47	Postcadential with repetition and sequential thirds
15	5	48-51 (1)	Sequential thirds repeated, ended by a PAC
16	25	51 (2) - 53	Closing of exposition
17	31	54-57	Development
18	27	58-62	Development repeated
19	30	62 (2) - 71	Retransition
20	26	72-75 (2)	Recapitulation P-theme statement and response
21	6	75 (3) - 79	Modified repetition of P-theme statement and response
22	7	79 (3) - 83 (1)	Cadential with no cadence
23	29	83 (2) - 89	Transition
24	28	90-93	S-theme compound basic idea
25	32	94-97 (2)	S-theme compound basic idea repeated
26	8	97 (3) - 99	Contrasting idea
27	33	99 (3) - 101	Continuation
28	12	102-104	Cadential with aborted cadence, leading into OMT
29	9	105-106	Continuation repeated
30	13	107-110 (1)	Cadential repeated with PAC
31	10	110 (2) - 114	Postcadential with repetition and sequential thirds motif
32	11	115-118 (1)	Sequential thirds repeated with PAC
33	15	118 (2) - 120	Closing

The piece begins with the statement of the sentential P-theme that lasts ten bars: bb. 1 – 4² feature the statement of the two-bar basic idea and its response; bb. 4³ – 7 the continuation which is based on the first fragment of the basic idea; and bb. 8 – 10 displays the

cadential function. This is then followed by a reprise of the continuation and cadential functions, transposed down an octave. A succession of scalic ascents then ensue, suggesting that we have now moved into transition territory.



Figure 7 K.283: P-space and start of TR, bb. 1-18

Figure 8 K.283: bifocal close and S-space, bb.19-33

Having had the medial caesura,¹³⁹ we are now presented with a new melody in the dominant, D major. This is the S-theme, although I would argue that only retrospective listening would reveal this to be the case.¹⁴⁰ Throughout the course of its presentation and reprise spanning eight bars, not once is this new melody supported by root position harmony. This may not necessarily be a problem were it not for the decisive bass movement in bb. 30-31 which strongly implies a confirmation of D major, arguably suggesting that whatever has preceded it might be no more than a preamble.¹⁴¹ What follows this dominant-to-tonic descent is a material which provides a sharp contrast to the lyrical theme in bb. 23-30 which, admittedly, bears a somewhat striking resemblance in character to the P-theme with its Alberti-like accompaniment and flowing melody. In conjunction with the lack of root position support in b. 23 onwards, one could almost be forgiven for considering, even for the most fleeting second, that the onset of the S-theme can be located in b. 31.

The reality is that the S-theme does begin in b. 23. In *Classical Form*, Caplin proposes four types of hybrid theme, with the fourth described as constituting 'a compound basic idea'¹⁴² [that] is followed by a consequent rather than a continuation'.¹⁴³ Caplin illustrates Hybrid 4 using bb. 21-28 from the fourth movement of Beethoven's String Quartet

¹³⁹ For a definition of medial caesura, see Hepokoski and Darcy, 24-25.

¹⁴⁰ This might be seen as a very early precedent to what Schmalfeldt has famously termed as 'becoming', i.e. the process whereby a certain formal function invites retrospective reinterpretation of its status. See Schmalfeldt, *In the Process of Becoming: Analytic and Philosophical Perspectives on Form in Early Nineteenth-Century Music* (New York and Oxford: Oxford University Press, 2011); Schmalfeldt, 'Form as the Process of Becoming: The Beethoven-Hegelian Tradition and the "Tempest" Sonata', ed. by Christopher Reynolds, *Beethoven Forum*, 4 (1995), 37-71.

¹⁴¹ Caplin has argued that a 'cadence is best understood as a *syntactical* component of music, as distinguished from the wide variety of musical forces that are, broadly speaking, *rhetorical* in function.' Furthermore, he has also advocated against viewing cadence as having the same function as a full stop in literature: 'Cadence . . . is an element of syntax, more specifically, an element that generates formal closure at specific levels of musical organization. Characterizing cadence as a type of musical punctuation is thus clearly problematic.' See Caplin, 'The Classical Cadence: Conceptions and Misconceptions'. Page 104 in particular has significance when applied to Hepokoski and Darcy's idea of MC; cf. Caplin (2018), 2 fn. 7 for further disagreement with Hepokoski and Darcy.

¹⁴² Contrasting basic idea itself is described by Caplin as 'a phrase consisting of a simple basic idea and a contrasting idea that does not close with a cadence', in Caplin, *Classical Form*.

¹⁴³ Caplin, *Classical Form*, 61.

in G, Op. 18/2, whose functional design loosely corresponds to that of bb. 23-31 (1) in the first movement of K. 283:¹⁴⁴

Table 4 Comparison of thematic structure

Beethoven, Op. 18/2, iv	Bar number	21-22	23-24	25-26	27-28
	Formal function	BI	Contrasting idea (CI)	BI	CI with PAC in b. 28
		CBI		Consequent	
Mozart, K. 283, i	Bar number	23-24	25-26	27-28	29-30
	Formal function	BI	CI	BI	CI with confirmation of V in bb. 30-31 (1)
		CBI		Consequent-like repetition of CBI	

This does not, however, discount the importance of the dramatic utterance in b. 31. Seeing as its component bears no resemblance to any of the preceding material in the hybrid we have just encountered, it is safe to assume that bb. 31-32 do not constitute what Caplin would call a continuation. Caplin lists four devices which characterise the continuation function: '(1) phrase-structural fragmentation, (2) acceleration in the rate of harmonic change, (3) increase in surface rhythmic activity, and (4) sequential harmonies.'¹⁴⁵ The lack of resemblance to bb. 23-30 rules out phrase-structural fragmentation in bb. 31-32, and with the latter being rooted in D major, there is neither harmonic acceleration nor sequential harmonies to be had. There is, admittedly, an increase in surface rhythmic activity, but I would argue that this particular example constitutes not a continuation, but another contrasting idea.

¹⁴⁴ For Caplin's thematic analysis of Beethoven's string quartet, see Caplin, *Classical Form*, 62, example 5.7.

¹⁴⁵ Caplin, *Classical Form*, 41.

This naturally raises the question, 'What, then, is the form of the S-theme?' I would suggest that the S-theme is made of a Hybrid 4 with an additional contrasting idea that is wholly separate from that found in the CBI. In bb. 33-34, we do see continuation function in play, based on the contrasting idea in the previous two bars. This is then followed by a thwarted attempt to cadence in b. 43 – the music instead backs up and repeats the entire continuation and cadential processes, bringing to mind the 'one more time' technique codified by Schmalfeldt.¹⁴⁶

The image displays a musical score for Mozart's K.283, measures 39-48. The score is written for piano in G major, 3/4 time. It consists of a treble staff and a bass staff. A box labeled 'Evaded cadence' points to measures 43-44, where the music repeats. A box labeled 'EEC' points to measures 45-46, where the music continues. The score includes dynamic markings like 'p' and 'f'.

Figure 9 Mozart, K.283: OMT attempt and EEC, bb. 39-48

The development is a fairly compact affair. Thematic development itself takes up only eight bars, four of which are set aside for repetition. In typical Mozartean fashion, the material worked out here is not actually derived from one previously encountered in the exposition. As Hans David points out, 'Mozart clearly was not motivated by the concept that a development section should elaborate all of the material presented in the exposition,

¹⁴⁶ See fn.1.

although his piano concertos establish such precedents.¹⁴⁷ That the four-bar material is also more akin to a presentation than a developmental theme per se is another unique selling point here – in fact, this four-bar material can be seen as a variant of the opening theme, only in the dominant.



Figure 10 K.283: development, bb. 54-58

This unexpected quality may well throw candidates off: excepting clips belonging to the continuation function, there is not really a presentational theme that can assume the status of a development comfortably. Arguably, the lack of a clear-cut development here – unlike in K.280 – makes for a more sophisticated creation. As Hatten puts it, the ‘sensitising of formal locations in terms of material functions enables a composer to achieve strategic markedness by the use of material presumably inappropriate for the location – beginning with a “cadential” theme, for example’.¹⁴⁸ The compact developmental section could in fact orientate this movement towards being categorised as a Type 1 instead of a Type 3 sonata, with Hepokoski and Darcy describing the former as follows: ‘The essence of the Type 1 sonata lies in the minimal retransitional-link . . . between the two large-structural blocks: the expository and recapitulatory rotations. In this type of sonata the second rotation begins immediately or very shortly after the end of the first’.¹⁴⁹ I am hesitant to label this movement Type 1, however, and prefer to see this as an instance of a Type 3 sonata with a peculiarly short developmental section: despite its brevity, it is demarcated very clearly as a separate

¹⁴⁷Hans T. David, ‘Mozartean Modulations’, in *The Creative World of Mozart*, ed. by Paul Henry Lang (New York and London: W. W. Norton and Company, 1963), pp. 56–75, 69.

¹⁴⁸ Hatten, *Musical Meaning in Beethoven*, 120.

¹⁴⁹ Hepokoski and Darcy, 345.

entity. Hepokoski and Darcy's definition of 'minimal retransitional-link' does not seem to apply to this section, what with its distinct melody and comparatively extended standing on the dominant.

It is also curious that the entirety of this section – retransition included – is grounded in the dominant. As the section which bridges the tonal tension found in the exposition and its resolution in the imminent recapitulation, it is normal to expect 'the greatest degree of tonal and phrase-structural instability' here, so as to generate the greatest possible relief in the recapitulation.¹⁵⁰ In the course of piecing the K. 283 puzzle together, this relatively stable passage has the potential to confound test subject who might mistake it for S-theme, or even P-theme if they are unable to perceive the initial tonic.

Taken as a package, the brevity, tonal stability and previously unseen thematic material of this supposedly developmental section suggest rather strongly, if viewed from the lens of Caplin's *Formenlehre*, the status of a pre-core, the definition of which contrasts markedly with that of a core with its 'instability, restlessness and dramatic conflict.'¹⁵¹

The brevity of the development is perhaps the only conspicuous element of this sonata. Except for the tonic reprise of the S-theme, the recapitulation is an exact copy of the exposition. There is no coda to round off the movement – it simply yet elegantly concludes with what Hepokoski and Darcy term the ESC. 'Mozart, who was technically no more an eccentric than an innovator, was not in the least a man born out of his time' – so wrote Brigid Brophy in her monograph on Mozart's operas.¹⁵² Conventional without being simplistic and trite, this movement embodies simple elegance.¹⁵³ At face value, these adjectival pairs might

¹⁵⁰Caplin, *Classical Form*, 139.

¹⁵¹Caplin, *Analyzing Classical Form: An Approach for the Classroom*, 422.

¹⁵²Brigid Brophy, *Mozart the Dramatist: The Value of His Operas to Him, to His Age and Us* (London: Libris, 2006), 21.

¹⁵³Caplin has cautioned against writing off such Classical compositions that 'may seem straightforward on the surface [but is in fact] rich in subtleties and presents complexities of compositional technique unrivalled by other composers, especially in the realm of musical form.' See Caplin, *Analyzing Classical Form: An Approach for the Classroom*, 4.

seem self-contradictory, but they capture the essence of this sonata and the Mozartean style perfectly.

2.4 Beethoven: Sonata in G, Op. 31 no. 1, first movement

Like the two Mozart movements discussed above, this Beethoven sonata movement is a Type 3 sonata. The similarities between the three pieces, however, end there. Beethoven's piano sonatas offer lessons in overturning, rather than following, Classical syntax. Opus 31, in particular, occupies a special place in his piano oeuvre: the set was the first publication following the composer's declaration to embark on a 'new path'. In a letter to his friend Wenzel Krumpholtz, Beethoven wrote that 'I am only a little satisfied with my previous works. From today on I will take a new path.'¹⁵⁴ This statement does not only hint at the composer's changing style, but also possibly linked to his determination to conquer his deafness and 'seize Fate by its throat'.¹⁵⁵ Following this declaration, which is included in Beethoven's Heiligenstadt Testament, Beethoven's contemporaries were quick to notice that his music took a new turn: radical and innovative, this stylistic overhaul ultimately gave way to the famous heroic manner of the so-called middle period.

That said, there has never been a single, widely accepted definition of the 'new path'. Beethoven himself never provided further clarification, and the closest thing to an explication that we have is perhaps the famous essay by Carl Dahlhaus, which defines the 'new path' as the processual style.¹⁵⁶ The general understanding of Beethoven's middle-period work has therefore been largely governed by the idea of form as process. In choosing this sonata movement, I hope to find out, in the context of this experiment, whether the 'new path' style

¹⁵⁴ Carl Czerny, *On the Proper Performances of All Beethoven's Works for the Piano*, ed. by Paul Badura-Skoda (Vienna: Universal Edition, 1982), 13; see also *Beethoven: Impressions by His Contemporaries*, ed. by O. G. Sonneck (New York: Dover Publications, 1998), 31.

¹⁵⁵ L. van Beethoven, *The Letters of Beethoven*, ed. & trans. by Emily Anderson (London: Macmillan & Co. Ltd., 1961), 68.

¹⁵⁶ See Dahlhaus, *Ludwig van Beethoven*, 167.

really is perceptible as a departure from the Viennese style that is commonly associated with Mozart. Moreover, this will also allow exploration into listening processes of those trained in the Western curriculum. Hepokoski notes:

One of our tasks as listeners is to determine where and to what degree the gaps lie between what normally happens in sonata forms and what actually happens here – and then to reflect on the implications of the entire structure placed before us. Coming to this understanding depends on the listener's negotiation between *previously internalised normative expectations and a deformational acoustic surface that features passages willfully transgressive of those norms*.¹⁵⁷

It is hoped that this comparative exercise will allow an insight into the 'how', the 'whether' and 'to what extent' audience of Classical music experience and process nuances in musical form.

Table 5 Beethoven, Op.31 no.1: segmentation

Number	Segment number	Bar number (beat)	Details		
1	11	1-7 (1)	P-theme: basic [1-3 (1)] and contrasting ideas [4-5 (1)]; continuation [6-7 (1)]	Antecedent	Grand antecedent
2	21	8-11	Cadential		
3	23	12-18 (1)	P-theme repeated in F major	Consequent	
4	32	19-22	Cadential		
5	12	23-30 (1)	'Corrective' cadence in G		
6	13	30-45	False TR and MC		
7	8	46-52 (1)	Reprise of P-theme		Dissolving consequent
8	14	53-65	MC		
9	5	66-73	S-theme in B major		

¹⁵⁷James Hepokoski, 'Sonata Theory and Dialogic Form', in *Musical Form, Forms & Formenlehre: Three Methodological Reflections*, ed. by Pieter Bergé (Leuven: Leuven University Press, 2009), pp. 71–89, 74-75, my emphasis.

10	22	74-88 (1)	S-theme in B minor
11	6	88-98 (1)	S-theme repeated with EEC
12	7	98-111	Postcadential
13	24	112-118 (1)	Reprise of P-theme
14	15	119-122 (1)	Development part 1
15	3	123-126 (1)	Development part 2
16	28	127-134 (1)	Development part 3
17	4	134-157	Development part 4
18	18	158-192	Retransition
19	25	193-200 (1)	Recapitulation of P-theme
20	26	201-204	Cadential
21	2	205-217	'Corrective' cadence and MC
22	1	218-225	Recapitulation of S-theme in E major
23	10	226-233	S-theme in E minor
24	27	234-241	S-theme in G major (RH)
25	17	242-256	S-theme in G major (LH)
26	16	256-266 (1)	S-theme repeated with ESC
27	30	266-279	Postcadential
28	29	280-295	False MC/start of coda
29	31	296-306	Coda part 1
30	19	307-314	Coda part 2
31	20	315-318	Coda part 3
32	9	319-325	Final cadence

This desire for stylistic revolution led to an eclectic mix of standard procedures and surprises, as can be seen in this G-major sonata. The main theme consists of what Burnham has called a 'comically disruptive exchange between disparate scraps of material'.¹⁵⁸ Despite its seemingly disjointed appearance, one can still discern a hybrid sentential design: a three-bar basic

idea is followed by a two-bar contrasting idea, after which comes a continuation that is based on the latter, and a cadence. In other words, this is effectively what Caplin would call a

¹⁵⁸Scott Burnham, 'Singularities and Extremes: Dramatic Impulse in the First Movement of Beethoven's "Tempest" Sonata', in *Beethoven's "Tempest" Sonata: Perspectives of Analysis and Performance*, ed. by Pieter Bergé (Leuven: Peeters Publishers, 2009), pp. 39–60, 53.

Hybrid 4 theme.¹⁵⁹ The fact that the contrasting idea is loosely based on the basic idea – despite only taking the jagged rhythmic pattern of the first two notes as the starting point – rather offsets the notion of 'disparate scraps'.¹⁶⁰

An interesting feature of this P-theme is its modulation towards the dominant in the cadential function. By detracting from the initial tonic, this cadence goes against one of the main P-theme functions: establishing the overall tonality of the piece. As we shall see, this dominant modulation will be a significant factor in aiding listeners' understanding of the thematic structure of the P-theme.

A reprise of the eleven-bar melody immediately follows. This is not, however, one's standard reprise, for Beethoven re-presents the Hybrid 4 in the flattened seventh. Again, this statement modulates in the cadential function to its dominant, C major. We therefore have a peculiar situation which undermines the very stability of P-space. Despite there being a clearly recognisable P-theme, no tonality has so far managed to reign supreme. The G - D and F - C pairings have a further complication: listeners could gravitate more towards the F - C - G - D cycle of fifth relation. This orderly ascent in fifths would effectively lead them to put the F - C statement first.¹⁶¹

¹⁵⁹ See Caplin, *Classical Form*, 63.

¹⁶⁰ As Matthew BaileyShea has pointed out, the 'extraordinarily malleable' quality of the sentence 'defies strict definition', and a basic idea can 'comprise just about anything assuming they are small enough to be perceived as a distinct unit within a larger cadential span.' See Matthew BaileyShea, 'Wagner's Loosely Knit Sentences and the Drama of Musical Form', *Intégral*, 16/17 (2002), 1–34, 21; and BaileyShea, 'Beyond the Beethoven Model: Sentence Types and Limits', *Current Musicology*, 77 (2004), 5–33, 7.

¹⁶¹ My gratitude to Scott Banister, Chris Blakey and Kelvin Lee for pointing this out in my presentation at the Postgraduate Seminar, Durham University on 4 December 2018.



Figure 11 Op. 31 no. 1: P-space, bb. 1-25

Despite being based on a logical premise, this harmonic design undermines the original layout of the opening, as well as Beethoven's deliberate harmonic ruse. The 'corrective' cadence in bb. 23-26 offers a clue as to the true order of the two P statements, as the C major chord in b. 23 is a natural consequent of its counterpart that concludes the F-major reprise. To juxtapose it against the PAC in D major in b. 11 would arguably be more unprecedented.

This 'corrective' cadence establishes G major as the tonality of the P-space, and therefore could arguably be seen as the end goal of a drawn-out process to cadence. We can now attempt to read the structure of the P-theme, which seems to consist of two parts: an antecedent that modulates to V in b. 11, with the V serving as the half cadence that would normally conclude an antecedent; a consequent that cadences in I in b. 26, via a detour to the flattened seventh and subdominant.

What follows this unusual – to say the least – opening is a dominant flourish which is reminiscent of a medial caesura, right up to the very pregnant pause on V in bb. 44-45. In

Elements of Sonata Theory, this would be a classic example of a V: HC MC which signals the start of S-space in the next bar or so. If this is true, then the dominant flourish that we have just had would be assigned the label 'transition' (TR). As outlined in *Elements*, this type of bravura is 'a decisive rhetorical gesture, all the more so if it is set up by one of the stylised, immediately recognisable terminal gestures ending a dominant-lock.'¹⁶²

What we get instead is a carbon copy of the first seven bars of the music, a surprising twist which affects the formal reading of P above, revealing this to be the consequent to the grand antecedent that starts in the first bar. If b. 46 is the start of the consequent phrase, then the role of the F-major intersection in bb. 12-22 is also called into question: is it a continuation or a contrasting middle?

An alternative to reading b. 46 as consequent to the first 45 bars is to treat it as the second refrain of a rondo (or sonata rondo). This perspective would become more appealing at the start of the development, for the G-major theme makes another appearance which is highly suggestive of the formal type.

With the benefit of hindsight, the first reprise in b. 46 is a dissolving consequent, i.e. a consequent that morphs into TR, eventually giving way to a III: HC MC that paves the way for the S-theme. The multi-temporal play of thematic structure that is in play in the P-space is summed up in **Error! Reference source not found..** The interplay of various formal functions in this section is similar to what Caplin terms 'hierarchical nesting': 'a given time-span on the musical foreground can be conceived to express multiple temporalities – seemingly at the same time, but really at different "time-spaces," so to speak with Lewin.'¹⁶³

¹⁶² Quoted in Hepokoski, 'Sonata Theory, Secondary Themes and Continuous Expositions: Dialogues with Form-Functional Theory', *Music Analysis*, 35.1 (2016), 44–73, 52; see also Hepokoski and Darcy, 30–34.

¹⁶³ Caplin, 'Responses to the Comments', in *Musical Form, Forms & Formenlehre: Three Methodological Perspectives*, ed. by Pieter Bergé (Leuven: Leuven University Press, 2010), pp. 51–68, 55. The idea of 'time-speak' is borrowed from David Lewin, 'Music Theory, Phenomenology, and Modes of Perception', *Music Perception: An Interdisciplinary Journal*, 3.4 (1986), 327–92.

Zooming out to S-space, we can see that the notion of a period governs the structure of this section. There are two pairs of thematic statements, with the first pair found in bb. 66-77 and the second in bb. 78-98. The asymmetry between the two brings to mind the grand periodic construct from the first half of the exposition. Formally speaking, S-theme itself exhibits properties of both the period and the sentence. That the major and minor phrases are paired together is reminiscent of the period, whereas the internal make-up of the melody is sentential despite omitting the cadential function – the entire eight-bar material is essentially supported by a tonic prolongation with momentary excursions to the dominant. Beginning in b. 66, this theme is uttered in both major and minor colourings – an ambiguity which persists throughout S-space and only resolved after a series of harmonic oscillation in the final bars of the exposition. The confirmation of iii as the S-space key not only serves to dispel the harmonic grey area thus far, but also brings the music closer to the tonic despite appearing as idiosyncratic on the surface.



Figure 12 Op.31 no.1, first movement: bb.65-79

Simply to label this theme as either periodic or sentential, however, is to overlook the subtleties surrounding its construction. In a similar fashion to the P-theme, the S-theme has the capacity to deceive by implying its completeness long before it actually concludes. The first eight bars (bb. 66-73), for example, gives the fleeting impression of having cadenced

twice before a closer investigation reveals the entire phrase to merely be tonic prolongational. This is then followed by a reiteration in the local tonic minor. This repetition, however, breaks off into a sequence which then undergoes fragmentation. Caplin defines compound basic idea as 'a phrase consisting of a simple basic idea and a contrasting idea that does not end with a cadence.'¹⁶⁴ Based on this interpretation, we could say that the S-theme takes the form of Hybrid 3 with periodic elements; Hybrid 3 itself is described as a combination of CBI and continuation.¹⁶⁵ The asymmetry that underlines the construct of bb. 66-78 is arguably closely linked to the conflict between the soprano and bass lines. On one hand, the melody in bb. 66-73 is tight-knit enough to be assigned the status of a fully fledged theme, yet its harmonic support does not allow this: giving the impression of a closed-off unit despite being tonic prolongational, this theme does not actually feature a PAC, therefore the harmonic confirmation is missing.¹⁶⁶ The minor reprise in bb. 74-78, however, loses its chance to be crowned the start of S-space as the melodic subject is now in the bass line. This does, however, allow bb. 74-78 to have a more vibrant yet united harmonic set-up, which consequently opens the possibility for harmonic process and conclusion, which duly take place over the course of the next twenty or so bars. The exposition is formally concluded by the EEC in b. 98.

In the process of segmenting, I have decided not to separate the codetta from the EEC (and ESC): they constitute two whole units that will not make sense if separated into four. As a result, these two clips will inevitably contain two functions. This will no doubt affect the way participants hear and process the clips, and I suspect many will misinterpret them to be continuatory simply because of the ending. Psychologists have observed that this behaviour is not entirely unsurprising. Many cognitive studies on music perception have noted that listeners' impression of music fades quickly, which means that the last thing heard is the one

¹⁶⁴Caplin, *Analyzing Classical Form: An Approach for the Classroom*, 107.

¹⁶⁵ See Caplin, *Classical Form*, 61.

¹⁶⁶ See Caplin, *Analyzing Classical Form: An Approach for the Classroom*, 286.

that is freshest in the mind. In the case of the EEC and ESC clips, this will mean that the cadential function will probably not be remembered as clearly as the continuatory gesture at the very end, leading to a high chance for misunderstanding.



Figure 13 Op.31 no.1: EEC (b. 98) and postcadential/expositional closure (b. 98 onwards), bb. 94-112

This S-space, far from being straightforward, is therefore likely to cause confusion for participants during the reconstruction process. It is possible to see the bigger picture on paper, but this is arguably not as aurally obvious. Segmenting this S-space would result in seemingly multiple instances of initiation function. Although it is likely that candidates would group these similar passages together, there is no guarantee that they would be able to do so elegantly. Harmonically speaking, the vacillating modality of this thematic group provides another challenge that participants have to overcome.

As if that were not enough formal play already, Beethoven then presents us with the aforementioned rondo-like reprise of P, yet again. Whichever way one sees this – be it as a repeat of the exposition or as the start of the next section, episode or development – the return

of this jagged melody calls into question the structure of the music – a running theme in the piece and one which arguably explains much of the idiosyncrasies encountered thus far. On one hand, the return of the opening music gives 'a strong sense of motivic return', which, by 'coinciding with harmonic return reflects the less dramatic and more symmetrical nature of the form.'¹⁶⁷ On the other hand, perhaps this reading is precisely what the music strives to turn on its head – this combination of symmetry and motivic simplicity turn out to be nothing more than a formal subterfuge.

A further point relating to functional ambiguity can be drawn out from the rondo refrain at the end of the exposition. This refrain is somewhat pre-empted by the seamless functional transition that starts at the point of the EEC: once iterated, the new tonality is emphasised by the postcadential gesture, which, however, does not remain as a postcadential until the end of the exposition; rather, it transforms into a pre-initiation with the onset of the two-note ascending staccato motif. This motif enables the rondo refrain to make an appearance flawlessly. The same event can be seen happening at the ESC, only that this time, it leads to the rondo refrain that merges with the false MC. The EEC and ESC of this sonata therefore carry more than just their share of concluding S-spaces, but also functional implications that hint at the evolving world of syntax.

The development takes two aspects found in P-space as its thematic foundation – the rhythmic conversation between parts and the scalar rush – and subject them to modulatory sequential treatment. We see the prominent status afforded to the jagged pattern from the start of the music, reaffirming it as one of the main traits of this piece and supporting the argument above against thematic disparity. Unlike the development in Mozart's K. 283, this development is clearly divided into three sections: pre-core, core and retransition that starts in b. 158, leading into the recapitulation in b. 193. Contrasting previous P-theme encounters,

¹⁶⁷ Steve Larson, 'Recapitulation Recomposition in the Sonata-Form First Movements of Haydn's String Quartets: Style Change and Compositional Technique', *Music Analysis*, 22.1/2 (2003), 139–77, 150.

this one does not take us by surprise as it is expected. In fact, one could even say that this is the most conventional event to have happened since the start of the piece.

Compared to its expositional counterpart, this P-space is rather brief. The omission of the F-major interjection as well as the fake MC-like dominant passage, however, gives listeners the chance to discern the music in a much more straightforward environment. The recapitulation of S-theme, too, offers a corrective moment in terms of tonality: following an E-major and an E-minor episodes, the music slickly moves on to G major, thus concluding the tonal game that has been kept up since the first move to the dominant in b. 11. Here, we see the importance of including both VI and vi (III and iii in the exposition): introducing VI allows a modern twist on a traditional procedure, but its minor counterpart provides a cushioning harmonic effect that facilitates the smooth transition back to the tonic.

The arrival of the coda is heralded by the final rondo refrain; the overall form of the sonata, therefore, is as follows:

Table 6 Op.31 no.1: two possible formal interpretations

Sonata	Exposition	Development	Recapitulation	Coda
Rondo	P - TR - S	P' - Devt. - Retransition	P'' - TR' - S'	P''' - Coda
	A B	A' C	A'' B'	A'''

The table above outlines the constant dialogue between sonata and (sonata) rondo forms in this piece. I previously suggested that this ambiguity offers an explanation for the various formal-functional ploys. 'A movement that searches' seems to be a suitable description, one that accounts for the sonata/rondo ambiguity, which in turn explains the constant demand to reassess our expectation and understanding. It is worth pointing out here that the final rondo-like refrain that heralds the start of the coda is actually the missing fake MC-like passage which forms the end of the first half of P-theme, and should have been present earlier on in

the recapitulation. That this passage has been displaced to this location is significant: it seems to affirm the notion that Beethoven intended this sonata to oscillate between sonata and rondo without ever fully assuming the role of either. The sonata/rondo tension illustrates the music's quest to become on a higher level; on the lower level, we have the various cadential attempts, mismatching statements and seemingly illogical harmonic pairings. Only at the end of these teasing exchanges do we finally comprehend the real nature of the music, tricks and all. This dialogical movement neatly illustrates the 'new path' style and its preoccupation with integration. As William Kinderman has noted, the composer increasingly displays a 'tendency to obscure formal landmarks within individual movements . . . the product of a concern with formal continuity applied to larger dimension of the music.'¹⁶⁸

The myriad of formal trickery that permeates this piece of music not only serves to mark a turn in Beethoven's stylistic journey, but also gives his listeners an arguably richer experience. As Meyer has suggested,

musical enjoyment lies as much, if not more, in the *act* of travelling as in the *fact* of arriving. What delights and moves us, as we listen to a composition, are the changing landscapes, the turns in the road revealing unexpected vistas, and the surprise of delectable detours encountered en route to goals of relative repose.¹⁶⁹

Sometimes, as Hugh Macdonald has comically put it, the surprises are violent: 'For all Beethoven's clear desire to write music of power and beauty, there is a cruel streak in his make-up of the kind that finds it amusing to beckon you closer and closer until you are near enough to receive a heavy punch on the nose.'¹⁷⁰ This, of course, is a form of musical irony that invites constant reconsideration on the listeners' part. Irony elevates musical experience

¹⁶⁸William Kinderman, *Beethoven's Diabelli Variations* (New York: Oxford University Press, 2008), 63.

¹⁶⁹ Leonard Meyer, *Explaining Music: Essays and Explorations* (Chicago: University of Chicago Press, 1973), 19.

¹⁷⁰ Hugh Macdonald, 'Beethoven's Game of Cat and Mouse', in *Beethoven's Century: Essays on Composers and Themes* (Rochester, N.Y.: University of Rochester Press, 2008), pp. 3–15, 14.

and speaks of the composer's worth: 'It is the power that preserves the [composer's] command over his material . . . Irony thus protects him from one-sidedness and empty idealizing.'¹⁷¹

2.5 Haydn: Sonata in E, Hob. XVI no. 22, first movement

Written in 1773, this sonata constitutes one of Haydn's earlier outputs for the piano and precedes Mozart's K. 283 by a year. Despite this proximity, however, the two first movements could not be more different architecturally speaking. For one, Haydn's Hob. XVI no. 22/i features asymmetrical outer sections: the recapitulation includes an expanded TR, complete with a separately marked Adagio interjection. This interrupted recapitulation will likely cause some confusion for participants who are familiar with the Classical sonata conventions, a similar phenomenon that has also been hypothesised to occur in the Beethoven.

This observation, however, gives rise to another question: Does our syntactical and structural awareness of Classical repertoire root itself in the Mozartean tradition? As Bruno Nettl once remarked,

Carnatic musicians in Madras . . . said to me, 'We have our trinity of great composers . . . just as you have your trinity,' meaning Haydn, Mozart and Beethoven. But I would like to argue that dualism is a more significant guide to the conceptual framework of the Music Building and its cultural context. Mozart and Beethoven are presented as emblems of the two ends of a continuum not only by the myth-makers; they have been so recognised by musicologists for a long time.¹⁷²

¹⁷¹ 'Sie ist die Kraft, die dem Dichter die Herrschaft über den Stoff erhält . . . So bewahrt ihn die Ironie vor Einseitigkeiten und leerem Idealisieren.' See Ludwig Tieck, *Erinnerungen Aus dem Leben des Dichters nach dessen Mündlichen und Schriftlichen Mittheilungen*, ed. by Rudolf Koepke, 2 vols (Leipzig: F. A. Brockhaus, 1855), II, 238-39.

¹⁷² Nettl, 'Mozart and the Ethnomusicological Study of Western Culture', 8.

In a similar vein, Michael Spitzer has written that 'Haydn is the main casualty of . . . the metaphor of music as motion, process and development' that, thanks to Beethoven, has so shaped the way we think about music.¹⁷³ The reality, of course, is that the master of Eszterháza is just as important a figure as Mozart and Beethoven – his music is the embodiment of wit, 'personally expressive' style, and, as James Webster puts it, 'experimentation[, which] was a fundamental aspect of [the composer's] musical personality, throughout his life.'¹⁷⁴

The inclusion of Haydn's work in this study aims to address this question. The piece chosen is appropriate considering that it is a close contemporary of Mozart's K. 283, yet the stylistic difference between the two are so striking, with Hob. XVI no. 22 featuring characteristics that are incongruous with the sonata conventions now recorded in modern textbooks. By adding Haydn to the repertoire to be tested, I seek to investigate whether his practices are heard to be as non-normative (again, in the context of this thesis, normativity is measured against definitions found in Caplin's taxonomical *Classical Form*) as Beethoven's are when placed side-by-side with Mozart's.

Table 7 Haydn, Hob.XVI no.22: segmentation

Bar no.	Code	Sonata space	Description
1-2	8	Exposition	Statement in tonic
3-4	9		Response on dominant
5-7 (2)	5		Reprise of bb. 1-2
7 (3) -8	3		Sequential continuation and cadence
9-11	18		TR
12-15	2		Dominant-lock ending with MC
16-17	10		MC-flourish 2 with EEC

¹⁷³Spitzer, 'Haydn's Reversals: Style Change, Gesture and the Implication-Realisation Model', in *Haydn Studies*, ed. by W. Dean Sutcliffe (Cambridge: Cambridge University Press, 1998), pp. 177–217, 178.

¹⁷⁴James Webster, *Haydn's 'Farewell' Symphony and the Idea of the Classical Style: Through-Composition and Cyclic Integration in His Instrumental Music* (Cambridge: Cambridge University Press, 1991), 362 and 365.

18-21 (1)	14		Closing
21 (2) - 24	15	Development	Dev of TR
25-30	20		Dev of P idea
31-33 (2)	12		Sequence 1
33 (3) - 36	13		Sequence 2
37-41	21		Retransition via descending linear progression
42-43	19	Recapitulation	Statement in tonic
44-45	6		Response in dominant
46-48 (2)	11		Reprise of bb. 42-43
48 (3) - 54	1		Sequence culminating in Adagio
55-66	17		TR culminating in MC with fill
67-68	7		MC-flourish 1
69-71 (1)	4		MC-flourish 2 with ESC
71 (2)-75	16		Closing

This sonata is divided into three sections: exposition (bb. 1-24), development (bb. 25-41) and recapitulation (bb. 42-75). The exposition is launched by a four-bar idea which is promptly followed by a repetition of the first two bars. It could be said that this opening theme (or P-theme) is a quasi-period inasmuch as the antecedent does not conclude with a I: HC MC; rather, the entire phrase is grounded in the tonic, with a brief excursion to the dominant in b. 3 providing a harmonic contrast in what is otherwise a tonic prolongational idea. The consequent phrase in b. 5 starts off by replicating the opening bars before continuing into a rising sequence which doubles functionally as continuation and cadential. With this restatement, the presentation of P-theme is complete.

Allegro moderato.

Quasi antecedent

Nº 34.

Quasi consequent

dolce

Figure 14 Hob. XVI no. 22: P-space, bb. 1-11

The music now enters a transitory phrase, again marked by an ascending sequential treatment that is potentially disarming to participants for its initiation-like quality. This sequence culminates in a dominant-lock starting in b. 12, which is interesting as it straddles both TR- and S-spaces:

V: HC MC plus fill?

S-theme?

V: HC MC attempt 3?

V: HC MC attempt 2?

Closing section

Figure 15 Hob.XVI no.22: TR and S-space, bb. 12-20

In other words, there is no clear boundary between the end of TR (in the form of the V: HC MC) and the start of S-space. The modulation to V is only confirmed in b. 20, and by that point, the music is ready to take off into the closing section. Geographically speaking, the potential S-theme candidate indicated above aligns itself more closely with Haydn's extensive dominant prolongation, and it resolves into a third HC MC-like gesture in b. 18. This arpeggio finally concludes the dominant-lock, ushering the arrival of the EEC in b. 20.

The lack of a clear-cut S-theme in this exposition raises the possibility of viewing this as a sonata with continuous exposition, i.e. an exposition that 'lack[s] a clearly articulated media caesura followed by a successfully launched secondary theme.'¹⁷⁵ Although this is a plausible viewpoint, I would argue that there is a nascent melody apparent in the upper part of the right hand in bb. 16-17, which is masked by the semiquaver figuration. This melody is

¹⁷⁵ Hepokoski and Darcy, 51.

admittedly underdeveloped, but it is arguably thematic enough to warrant not being overlooked as a potential S-theme.

Following the end of the exposition in b. 24, Haydn introduces the development using a combination of the opening chord and TR idea in iii; this constitutes the first section of the development. To listeners, the reuse of the opening chord and TR material here could well bring the idea of initiation to mind, which means that they could mistake the development for the opening. The second section begins in b. 31, showcasing the P-theme transposed into IV. The material very soon undergoes a liquidation process which passes through a momentary modulation to the mediant, G# minor. This design is a typical Haydnesque construction as has been observed by Beth Shamgar: 'Haydn tends to subdivide the development into three distinct areas: a stable preface, an inner modulatory core, and a stable conclusion.'¹⁷⁶ From this region, there is very little of the conventional dominant-lock retransition: what we have instead is a step-wise motion in the bass via F# which leads to the recapitulation in b. 42. Spitzer has pointed out that

good tonic preparation was less pertinent to eighteenth-century ears than clear textural signposting and, more importantly, than modal resolution from minor to major. It seems that this resolution could be effected equally well by, on the one hand, a shift from minor-mode passagework to the retransition proper, and, on the other hand, from minor-mode passagework directly to the reprise.¹⁷⁷

If this is true, then this sonata's retransition starts from the moment the subdominant in b. 34 starts edging downwards – harmonically speaking. This passage, then, is 'just as much a "retransition" as the retransition proper,' which is perhaps taken to be b. 40, if we are to adopt

¹⁷⁶Beth Shamgar, 'Rhythmic Interplay in the Retransitions of Haydn's Piano Sonatas', *The Journal of Musicology*, 3.1 (1984), 55–68, 57. Shamgar's idea here is a precursor to Caplin's three-part developmental argument, consisting of pre-core, core and retransition.

¹⁷⁷Spitzer, 'The Retransition as Sign: Listener-Orientated Approaches to Tonal Closure in Haydn's Sonata-Form Movements', *Journal of the Royal Musical Association*, 121.1 (1996), 11–45 <<https://doi.org/10.1093/jrma/121.1.11>>, 29.

the view that retransition constitutes a dominant-lock. 'The sonata thus has two retransitions, a "false" one in the minor and a "true" one ending in the major.'¹⁷⁸

The image displays a musical score for Hob.XVI no.22, measures 31-43. The score is written for piano and features two systems of staves. The first system includes a 'Retransition' label above the right-hand staff. The second system includes a 'Retransition' label above the right-hand staff and a 'Recapitulation' label below the left-hand staff. The music is in G major (one sharp) and 3/4 time. It includes various dynamics such as *f*, *p*, *cresc.*, and *mf*. The score is annotated with numerous fingerings and articulation marks.

Figure 16 Hob.XVI no.22: the two retransitions, bb. 31-43

In comparison to the two other sonatas in this project, the recapitulation in this movement is unique in that it is not a structural mirror image of the exposition. For a start, the consequent is considerably expanded starting from b. 48 to accommodate the (comparatively) early onset of V. This, of course, culminates in the one-bar Adagio in b. 54, which momentarily brings the music to a halt. This unexpected turn of events essentially creates a momentary diversion in the flow of the music; in other words, an 'alternative path' which has been theorised by Brian Jarvis and John Peterson as follows: 'a special kind of phrase

¹⁷⁸Spitzer, 'The Retransition as Sign', 29.

expansion created by the appearance of material that temporarily or permanently changes the expected trajectory of the phrase toward its goal.¹⁷⁹



Figure 17 Hob.XVI no.22: modified recapitulation, bb. 48-55

A possible explanation for this diversion could be that the lack of dominant preparation at the end of the retransition necessitates the insertion of a stabilising dominant passage in the recapitulatory space by way of compensation. In his article, 'The Retransition as Sign,' Spitzer notes that 'after a turbulent passage of modulations or a cycle of fifths, a dominant pedal enacts a stabilising function as a point of arrival and of rest.'¹⁸⁰ The lack of such a pedal at the end of the retransition of this sonata arguably brought about the necessity for a 'compensatory dominant zone.'¹⁸¹ Citing the opening movement of Haydn's Piano Sonata, Hob. XVI no. 38, which also features an emphatic dominant zone at the start of the recapitulation, Markus Neuwirth argues that this tactic 'might [have] been motivated by [Haydn's] intention to compensate for the missing dominant preparation at the end of the

¹⁷⁹ See Brian Edward Jarvis and John Peterson, 'Alternative Paths, Phrase Expansion, and the Music of Felix Mendelssohn', *Music Theory Spectrum*, 41.2 (2019), 187–217 <<https://doi.org/10.1093/mts/mtz009>>, 190.

¹⁸⁰ Spitzer, 'The Retransition as Sign', 25. Cf. Meyer's comment in Leonard Meyer, *Explaining Music: Essays and Explorations*: 'Patterns tend to be continued until they become as complete and stable as possible . . . Once established, a patterning tends to be continued until a point of tonal-rhythmic stability is reached.'

¹⁸¹ Lubov Russakovsky, 'The Altered Recapitulation in the First Movements of Haydn's String Quartets', *Dutch Journal of Music Theory*, 6.1 (2001), 27–37, 24. Neuwirth remarks, however, that Russakovsky's 'intuitively convincing [terminological construction nevertheless] raises problems of circularity and arbitrariness similar to those raised by the notion of redundancy, as raised' earlier in pages 370-76 of Neuwirth, 'Does a "Monothematic" Expository Design Have Tautological Implications for the Recapitulation? An Alternative Approach to "Altered Recapitulations" in Haydn', *Studia Musicologica, Haydn 2009: A Bicentenary Conference Part II*, 51.3/4 (2010), 369–85.

retransition . . . where the listener encountered a harmonic juxtaposition of vi and I, and, by consequence, a rather abrupt entrance of the recapitulation.¹⁸² Although the re-entry of the P-theme in Hob. XVI no. 22 is not as abrupt as Neuwirth's case study, it is arguably still not as prepared as it would have been had there been a root-position dominant, for example. The colour given by a root-position dominant would have prepared listeners for the 'release and return' of the recapitulation;¹⁸³ its absence in this movement could well be compensated by the recomposed recapitulation.

When it does resume, we encounter the same material found in the expositional TR. This rather impish twist of events – as if Haydn is pretending that nothing out of the ordinary has happened and chooses to proceed as usual – constitutes the other main syntactical issue in this movement.¹⁸⁴ That aside, the rest of the recapitulation follows the path set out in the exposition, notwithstanding the return of the tonic for the entirety of the section. The same ambiguity surrounding TR- and S-spaces remain.

Despite being contemporaneous with Mozart's K. 283, Haydn's sonata is definitely not a straightforward artefact; or rather, it is a deceptively straightforward piece of art. Spitzer has suggested that although Haydn's phraseology 'demonstrably belongs to the same family as Mozart's, [it] is [nevertheless] fraught with unresolved tension. In short, although his schema contains and regulates its constituent features, it fails to *assimilate* them.'¹⁸⁵ This is not to say, however, that Haydn's music contains elements which are disparate – far from it. Although Haydn does not, like Mozart, often plump for clear-cut syntactical practices, his musical elements nevertheless fit together, if only in retrospect. As Meyer has said, 'A good

¹⁸²Neuwirth, 'Does a "Monothematic" Expositional Design Have Tautological Implications for the Recapitulation? An Alternative Approach to "Altered Recapitulations" in Haydn'.

¹⁸³See William S. Newman, 'The Climax of Music', *Music Review*, 13 (1952), 283–93.

¹⁸⁴Steve Larson has argued that sonata exposition with 'shorter phrases do not establish the dynamic tension [building towards a dramatic recapitulation] that the longer expanded phrases of [Haydn's] later works do.' The recapitulation of Hob. XVI no. 22 is therefore rather unique in this sense. See Larson.

¹⁸⁵Spitzer, 'Haydn's Reversals: Style Change, Gesture and the Implication-Realisation Model', 212 (original emphasis).

composition makes us feel the uncertainty of the improbable, even while convincing us of its propriety. It confronts us with the capricious and cons us into believing it was necessary.¹⁸⁶

In fact, the same argument can be applied to Beethoven's Op. 31, too.

To delve into Haydn's world proper, therefore, it seems that one cannot separate 'technical analysis [from] the critical hermeneutics of Haydn's rhetorical (that is, "comic") strategies', for these are what make the music uniquely Haydn.¹⁸⁷ As is the case with Beethoven, Haydn engages with his listeners by employing a rhetoric that gives rise to a form of 'mental play', whereby 'the listener's cognitive "exhilaration" in having all her subconscious inferences validated, or her sense of "cognitive irony" in having her forecasts proved only partly right, or her "cognitive shock" at being completely mistaken and thus wholly surprised' are part and parcel of the music's trajectory and narrative.¹⁸⁸ As Elaine Sisman has declared: 'The compositional resources of a Haydn or a Mozart inevitably defeat any fixed theoretical system.'¹⁸⁹ Patterns there may be, but the master of Esterháza always has plenty of surprises for his discerning listeners.

Tracing the growing self-consciousness in the arts in the late eighteenth- to early nineteenth centuries, Mark Evan Bonds writes that Haydn's use of devices which flagrantly overturn conventions of the time is really meant to recalibrate 'the nature of the aesthetic equation in a fundamental way, for these devices subvert the sense of illusion.'¹⁹⁰ Music gradually becomes a canvas for personal expression, rather than just a pragmatic art form that

¹⁸⁶Leonard Meyer, *Explaining Music*, 21.

¹⁸⁷Spitzer, 'Haydn's Reversals: Style Change, Gesture and the Implication-Realisation Model', 181.

¹⁸⁸Narmour, *The Analysis and Cognition of Basic Melodic Structures: Implication-Realization Model* (Chicago: University of Chicago Press, 1990), 121.

¹⁸⁹Elaine Sisman, 'Small and Expanded Forms: Koch's Model and Haydn's Music', *The Musical Quarterly*, 68.4 (1982), 444–75, 475. Quoting Stravinsky – who once said, 'Step by step, link by link, it will be granted to discover the work' – Meyer argues that the quality of a composer's composition 'depends both upon his ability to discern or . . . to invent such implications and upon his artistic judgement in selecting interesting and fruitful ones for his composition.' See Leonard Meyer, 20; Igor Stravinsky, *Poetics of Music*, trans. by A. Knodel and I. Dahl (Cambridge, Mass.: Harvard University Press, 1947), 50.

¹⁹⁰Bonds, 'Haydn, Laurence Sterne, and the Origins of Musical Irony', 84.

serves as 'an instrument for getting something done'.¹⁹¹ This simultaneously engages the listener on a deeper level – for some devices used produce effects of such 'brazen a manner that the listener cannot help but be made aware of the very act of listening'¹⁹² – and redefines the meaning of an aesthetic experience: no longer just an illusion, the act of listening is now a mechanism by which listeners are made aware of 'the artificiality of that art' work that they are enjoying.¹⁹³

Experimental participants should be aware of the dangers that this short and impish sonata poses. Firstly, the lack of a clear S-theme is a potential issue: the whole thematic burden lies on the primary theme. Despite being a clear initiation entity, it runs the risk of being misinterpreted due to the frequent repetitions without a contrasting material to counteract these iterations. In a conventional sonata, the presence of two themes of contrasting nature would lessen this thematic burden slightly: listeners, and in this case, experimental candidates, could weigh between two options rather than putting their eggs all in one basket, which heightens the risk of misinterpretation, if indeed there is any. Secondly, the fleeting nature of this sonata, especially in the second half with its ever-morphing functions, does not lend itself naturally nor easily to straightforward perception, which may well hinder reconstruction efforts. There is no clear boundary between the end of the TR and the start of the S-space; furthermore, the ambiguity of the music in the second half of the exposition poses a challenge in identifying the secondary theme in this sonata, if one can be said to exist at all. The presence of a caesura gap would have aided attempts to locate S-theme, but in its absence, listeners are likely to be handicapped.¹⁹⁴

¹⁹¹Meyer Howard Abrams, *The Mirror and the Lamp: Romantic Theory and the Critical Tradition* (New York: Oxford University Press, 1953), introduction.

¹⁹²Bonds, 'Haydn, Laurence Sterne, and the Origins of Musical Irony', 70.

¹⁹³Bonds, 'Haydn, Laurence Sterne, and the Origins of Musical Irony', 72.

¹⁹⁴ As Hepokoski has said, 'the MC, literally construed, is the caesura-gap following the end-of-TR set-up, [which] is a major factor in our perception of it [and the imminent arrival of S].' See Hepokoski, 'Sonata Theory, Secondary Themes and Continuous Expositions: Dialogues with Form-Functional Theory', 52.

Chapter 3: The experiments

3.1 Design and implementation

3.1.1 Original procedure

After the Mozart and Beethoven sonatas had been analysed intra- and inter-thematically, they were segmented using ProTools into clips that were then numbered randomly – in this way, they became disordered puzzles. Two Soundcloud playlists were created, one for each sonata, and the clips were uploaded onto the relevant playlist. A Word document (see Appendix 2) was used as the answer sheet. The sheet contains the links to these playlists, instructions, and demographic survey. Participants were told to listen to the clips on Soundcloud and rearrange them to make the most aurally satisfying sequences, note down the numerical sequences that made up their answers, record these on the answer sheet, and indicate their confidence rating for each segment in brackets.

3.1.2 Pilot sessions

Two trial sessions were run; two second-year PhD candidates specialising in Music Analysis and a second-year undergraduate taking Theory and Analysis and Psychology of Music were involved. These trial sessions were timed, with each puzzle allocated 45 minutes. The results were disappointing: not even the PhD students managed to solve half the puzzles in the time allotted, despite claiming that they were familiar with the pieces in question. The puzzles, in short, seemed to be not feasible as real-life experiments.

Based on this observation, I decided to do away with time limit: not only would it put unnecessary pressure on participants, time limit also would not enhance data points in any meaningful way considering the central question under investigation. Despite the

disappointing outcome, I did glean one important piece of information: familiarity does not guarantee syntactical awareness – considering that the trial subjects were PhD-level analysts, this discovery was all the more telling.

3.1.3 First round

Recruitment started in January 2019 for first-year students, and March 2019 for third-years. I had to consider summative assignment deadlines for each year group, which accounted for the different timings. Twenty people signed up: fourteen from the first-year (mean age: 18) and three from the third-year (mean age: 21). Around the same time, I also began asking non-musician friends regarding their willingness to participate; thirteen people agree to do it (mean age: 22). The January batch was given until March to return their results, and the March group until June, as this would allow them ample time to finish their final-year deadlines first.

I initially divided each pool of participants into two, with half doing the Mozart and the other half the Beethoven. This decision was taken after considering the lengthy completion time implied during the trial runs – for no reward (owing to the lack of funding), I thought it would be highly unlikely that participants would be willing to devote over two hours to a task that was irrelevant to their academic and extra-curricular lives. This tactic was implemented during the recruitment process. Further discussions, however, resulted in a change of decision: the experiment would arguably be more fairly designed by having each participant reconstruct both puzzles – any perceived syntactical difference between Mozart and Beethoven could only be obtained by having the same person complete both.

This change of tactic proved to deter plenty of participants. 40% of Music students recruited withdrew from the study, and those who remained had to be pestered to return their answers. The same issue happened with the pool of non-musicians, but was softened by friendship ties.

3.1.4 Results from Soundcloud-based experimental run and addition of third puzzle

Results obtained from the 2018/2019 academic year strongly suggest that syntactical understanding was more in line with Mozartean principles: the Mozart was always reconstructed to a much better level, both functionally and sequentially. It was obvious that participants could internalise and synthesise Mozartean style more easily than they could Beethoven's 'new path.' This naturally raised the following question: is our cognitive understanding based primarily on Mozart? To address this issue, it was decided to include a Haydn piano sonata to the equation. This approach has the potential to kill two birds with one stone: firstly, having a third style in the mix would help gauge whether general syntactical understanding was more Mozartean, or whether Mozart was simply easier than Beethoven's 'new path;' secondly, inasmuch as Haydn and Beethoven's styles have been considered to be quirky amongst the Classical school, this would allow us to see whether one would be heard to be more unusual than the other in real-time condition, or indeed, if both are equally unorthodox.

Haydn's Hob. XVI no. 22 was added in June 2019 on the grounds of being an early work that has not been overly played (Spotify popularity index of 5 and Youtube hits in the low thousands), and a contemporary of K. 280 and K. 283, which ensures fairness with regard to stylistic similarity to a certain degree. This sonata was analysed and segmented according to the methods outlined above, and uploaded onto the interactive website as the third puzzle.

3.1.5 Second round

The second round of recruitment began in October 2019. There were six first-year and three third-year analysis students as well as five non-music-students; the mean ages of the three groups are 18, 21, and 22 respectively. None of them had participated in the first round and

they were required to complete all three puzzles. In addition, I also persuaded all the non-music-students and two former first-year students from the first round to take part in the newly added Haydn puzzle. This time, it was decided that a two-week deadline should be imposed: this would not only prevent candidates from forgetting about the task, but also to avoid being caught up in the first deadline season, which took place in the middle of November. Availability of funding also meant that I was able to offer chocolate to every participant and a raffle for Amazon vouchers worth £25 each. Taken together, the deadline and reward system proved to be a better strategy, with a higher candidate retention rate and much more prompt return of answers.

3.1.6 Second round: procedure

It became clear from the first round of experiments that the interface used to administer the puzzles was not at all user-friendly. Having to switch between two modes of presentation proved to be an irritant for many participants, not to mention a hindrance to accuracy as many subjects ended up doubling clips due to there not being a system to notify them of such error.

A colleague at Oxford University kindly offered to create an interactive website, which would house and play the clips, and enable reconstruction 'on-site';¹⁹⁵ this website was used throughout the second experimental run in 2019/2020. The Java-powered site contained three pages, one for each sonata. The first half of the page displayed the instructions and the second half the puzzle segments as numbered boxes. These boxes were movable by mouse clicks; each contained the relevant numbered sound clip as well as drop-down confidence rating marker. Participants completed the tasks by first clicking the audio buttons to listen to the randomly ordered clips before clicking and swapping the boxes to obtain what they thought was the best order. At any point, they could check the overall audio product by clicking on the 'Play all' function at the bottom of the instructions space. When confidence

¹⁹⁵<https://www.robots.ox.ac.uk/~gwpd/mpuzzle/>

rating for each segment has been indicated, the site would generate the puzzle answer, i.e. the series of numbers and confidence ratings, in a format capable of being copied and pasted onto a separate answer sheet.

The answer sheet for this second round takes the form of a Google Form to simplify data collection.¹⁹⁶ This four-part form consists of the following: introduction; consent form; puzzle answer sheet; and demographic survey. Participants copied their answer into the third part. The incorporation of this online platform proved to be a very positive one, despite some confusion regarding the operation of the interactive website.

3.1.7 Participants

Participants were recruited from three types of demographics, with the first two groups based at Durham University: first-year Music undergraduate students studying Analysis 1: Elements of Tonal Theory and Practice (group code S for 'subject'); third-year Music undergraduates studying Studies in Symphonic Analysis (group code F for 'finalist'); and individuals aged between 18 and 28 who have never read Music at university level (group code NM for 'non-Music-students').¹⁹⁷ The rationale behind this demographic selection process was based on the premise of expertise, which is one of the factors underpinning the premise of this study: different levels of expertise would result in varying levels of accuracy in reconstructing and syntactical awareness. In the context of this PhD study, expertise is defined in two ways: theoretical and analytical expertise, which is an outcome of formal training at university level; and general practical expertise, which one gets from honing performance skills in

¹⁹⁶https://docs.google.com/forms/d/1QP6X_IvXUGqtKDcgukVPiRdvTQL0Sf0iq7vbB4Wc94k/edit

¹⁹⁷ In the context of this PhD, non-musician subjects are defined as those individuals not currently or never having been enrolled on a university-level Music course. They may, however, have had years of instrumental training or studied GCSE or A-Level Music.

extracurricular music lessons.¹⁹⁸ As stated before in Chapter 1, one of my hypotheses is that structural awareness and accuracy would be more apparent in individuals who have had formal training in music theory, and not those whose musical education has revolved around practical lessons. To investigate the extent to which this difference is apparent and manifest in various profiles, it is imperative to include as wide a participant pool as possible – the inclusion of three groups in this study is an attempt to fulfil this goal.¹⁹⁹

All but six participants have had at least three years' worth of music lessons, with many playing more than one instrument. For S and F groups, the years indicated are exclusive of the time spent at university; in other words, an F participant with twelve years of training has in fact fifteen years of music education, taking into consideration the three years spent reading Music at university. Those who play the piano may sometimes indicate familiarity with some (or all) of the pieces used in this experiment, but familiarity, as we shall see, does not at all guarantee accuracy.

Aside from training, information regarding pitching ability was also collected. The questionnaire given required participants to indicate whether they possessed absolute or relative pitch.²⁰⁰ All but five subjects have relative pitch. Pitching ability was considered to be an important factor in determining reconstruction accuracy: having this aural aid would arguably assist participants in reconstructing the puzzles, especially in terms of grouping themes and working out logical harmonic progressions. Like familiarity, however, it will

¹⁹⁸ From here on, extracurricular music lessons will simply be referred to as music lessons. Formal training in theory and analysis will be specified as such.

¹⁹⁹ It is important, however, to note that in research such as this, it is often impossible to obtain a perfectly fair baseline when comparing expertise. As has been pointed out by Wöllner and Halpern, 'specific training cannot be separated from preexisting skills/genetic predisposition in many studies, because the experts have self-selected into their domain and researchers do not normally have pretraining baseline data.' See Wöllner and Halpern, 'Attentional Flexibility and Memory Capacity in Conductors and Pianists', *Atten Percept Psychophys*, 78 (2016), 198–208, 199.

²⁰⁰ For a definition of absolute and relative pitch, see, for example, Christopher Bartlette, Michele L. Henry, and Jordan Moore, 'Interaction of Relative Pitch Memory and Latent Absolute Pitch for Songs in an Ordered List', *Psychomusicology: Music, Mind, and Brain*, 24.4 (2014), 279–90 <<https://doi.org/10.1037/pmu0000064>>.

seem to be that pitching ability does not affect accuracy and syntactical awareness very much.

The demographic survey also asked participants to indicate their preferred musical genres. The most commonly ticked are classical, hip hop, rock, jazz and soul/R&B.

Table 8 Classical music preference

Classical music preference	
First-year undergraduates (S)	66.7%
Final-year undergraduates (F)	50%
Non-music students (NM)	66.7%

Despite this study being largely targeted at individuals studying Western art music, it is obvious from the table above that Classical music is not to everyone's liking. In the context of this study, this might just be a positive aspect: not only is bias minimised, there is also the opportunity to investigate whether frequent exposure to a particular style helps in the reconstruction process. As I outlined in Chapter 1, another hypothesis of this study is that being exposed frequently to Classical music would prove helpful in completing the puzzle tasks: exposure is akin to indirect training, which would likely help participants make educated decisions, even if subconsciously, regarding the syntactical procedure at play in the pieces used in this study.

Participants were asked to give a brief account of any strategy used in solving the puzzle. An analysis of these comments separates candidates into five categories:

1. those who deliberately used their conceptual knowledge of sonata form to solve the puzzles, thus showing theoretical awareness
2. those who identified the tonality of each clip and used it as the main reconstructive aid

3. those whose initial tactic was to group clips according to thematic similarity before proceeding to whittle remaining clips according to dynamics, stylistic cues and syntax
4. those who identified the beginning and the end, after which they worked their way from either end to meet in the middle (a fill-in-the-gap exercise of sort)
5. and those who blindly guessed according to the tempi and volume levels in the clips.

Finally, participants were asked to note down the amount of time they took to solve each puzzle. Seeing as the tasks were takeaway online exercises of considerable length, it is only to be expected that the durations indicated are only approximations to the nearest possible minute. Nevertheless, an analysis of these durations gives a telling observation: in general, Music students, i.e. S and F groups, spent much longer on the three puzzles than their NM contemporaries. One possible explanation for this could be performance anxiety, which has been described by psychologists as the regression of performance by those explicitly trained in a particular skill. Non-music students, on the other hand, approached this task with no prior consciously accessible declarative knowledge and therefore no benchmark against which to rate their performance, leading to minimum pressure. According to psychologist Roy Baumeister, 'in attempting to consciously monitor their performance, [individuals trained in a specific trade] are utilizing or "reinvesting" in their explicit knowledge base. The result is that performance regresses to a conscious level associated with the earlier stages of learning.'²⁰¹ This argument has been supported by a study investigating golf-putting skills, which discovered that performance regressed when participants were required to follow explicit procedures. Although golf-putting is a skill that requires explicit training, successful execution largely relies on automation. Of course, it must be acknowledged that these studies

²⁰¹ See Roy F. Baumeister, 'Choking under Pressure: Self-Consciousness and Paradoxical Effects of Incentives on Skillful Performance', *Journal of Personality and Social Psychology*, 46.3 (1984), 610–20 <<https://doi.org/10.1037/0022-3514.46.3.610>>, as quoted in Lew Hardy, Richard Mullen, and Graham Jones, 'Knowledge and Conscious Control of Motor Actions under Stress.: EBSCOhost with Navigator', *British Journal of Psychology*, 87 (1996), 621–36, 622.

are centred on real-time motor performance, which is not the same as the offline puzzle tasks assigned in this study. Nevertheless, I would argue that this reconstruction experiment posed a similar challenge to the studies cited above: the tension between instinct and explicit theoretical knowledge reported by participants can be seen to mirror the relationship between automation and explicit procedure.²⁰²

3.2 Overview of findings

3.2.1 Abbreviations used

As mentioned previously, the following are abbreviations used for the three demographic groups:

- NM: non-musicians
- S: first-year undergraduates
- F: final-year undergraduates

3.2.2 Familiarity

The terms 'expertise' and 'familiarity' are not interchangeable in the context of this study: the former refers to the amount of formal training received, whilst the latter refers to knowledge of the piece, e.g. 'I've heard or played it before.' This is similar to what Jamshed Bharucha has called schematic and veridical expectancies: the former refers to the abstraction of recurrent commonalities by the brain and the encoding and schematisation of these events into representations to enable future comprehension – the extent of which can be reasonably linked to exposure via training, leading to expertise – whereas the latter is generated by 'the

²⁰² 'Verbal protocols collected from all subjects showed the implicit learning groups had far less knowledge of the "rules for execution" available for conscious processing than the explicit learning group . . . The experiment produced evidence supporting the [following] hypothesis: [that] disruption of the automaticity of a skill under pressure will be less likely if the skills has been learned implicitly (without knowledge of rules) rather than explicitly (with knowledge of rules).' See R. S. W. Masters, 'Knowledge, Knerves and Know-How', *British Journal of Psychology*, 83 (1992), 343–58, 354.

activation of memory traces for specific pieces or by explicit prior knowledge of what is to come, as is the case with 'I've heard or played it before.'²⁰³ In the context of this study, expertise and familiarity are used to indicate the extent to which we may assume a candidate's ability to complete the reconstructions in as accurate a manner as possible.

It is perhaps natural to assume that familiarity (piece-specific) would translate to accuracy in this musical puzzle game, and that genre familiarity would assist reconstruction in the case of those unfamiliar with a specific piece used. Research has shown that the more musical exposure a person has, the greater their memory representation and recall ability for both familiar and unfamiliar pieces.²⁰⁴ Knowing a piece well would help you piece it back together, or at least, give you a head-start in identifying the main themes. The latter stands true, as first proven in the November 2018 trial run; the former, however, does not. The trial run saw two second-year PhD students in Theory and Analysis claiming familiarity yet failing to advance further than identifying and piecing the primary and secondary themes in Puzzle 1 in the initially allotted 45-minute slot.

The table below outlines the spread of familiarity among the 37 participants in the three demographic groups:

Table 9 Familiarity among participants

Number of people familiar with			
	Mozart	Beethoven	Haydn
S	5/15	1/12	1/9
F	2/6	2/6	1/3

²⁰³ Jamshed J. Bharucha, 'Music Cognition and Perceptual Facilitation: A Connectionist Framework', *Music Perception: An Interdisciplinary Journal*, 5.1 (1987), 1–30, 2; see also E. Rosch, 'Principles of Categorization', in *Cognition and Categorization*, ed. by E. Rosch and B. B. Lloyd (Hillsdale, New Jersey: Erlbaum, 1978); D. E. Rumelhart, 'Understanding and Summarising Brief Stories', in *Basic Processes in Reading: Perception and Comprehension*, ed. by D. G. Bobrow and A. M. Collins (Hillsdale, New Jersey: Erlbaum, 1977); R. Schank and R. P. Abelson, *Scripts, Plans, Goals, and Understanding: An Inquiry Into Human Knowledge Structures* (Hillsdale, New Jersey: Erlbaum, 1977).

²⁰⁴ See W. J. Dowling and others, 'Melody Recognition at Fast and Slow Tempos: Effects of Age, Experience, and Familiarity', *Perception & Psychophysics*, 70.3 (2008), 496–502; F. Bailes, 'Dynamic Melody Recognition: Distinctiveness and the Role of Musical Expertise', *Memory & Cognition*, 38.5 (2010), 641–50.

NM	2/18	1/17	1/15
Percentage values			
S	33.3	8.33	11.1
F	33.3	33.3	33.3
NM	11.1	5.88	6.67

The survey included in the study did not specify the meaning of 'being familiar', which meant that even those claiming to know the opening theme – such as S3 who explained that she 'roughly know how the melody goes' – would be eligible to tick the familiarity box. Despite this methodological shortcoming, the extent to which each of these individuals' was actually acquainted with the pieces in question soon becomes clear when analysing their reconstructions: some were able to reconstruct the sonata to near accuracy bar the recapitulation, whilst others were clearly only cognisant of the opening. This is in line with Bharucha's argument: 'Depending upon the history of one's musical and extramusical exposure, particular combinations of stimuli on some future date may conspire to trigger a memory if its trace receives sufficient activation.'²⁰⁵

The table below displays candidates who indicated familiarity with one or two of the puzzles on offer; no candidate was familiar with all three.

Table 10 List of candidates familiar with puzzle pieces

	Puzzle 1	Puzzle 2	Puzzle 3
S1		Yes	
S2	Yes		
S5	Yes		
S8	Yes		
S10	Yes		Yes
S11	Yes		
F2		Yes	

²⁰⁵ Bharucha, 'Music Cognition and Perceptual Facilitation,' 26.

F3	Yes		
F6	Yes	Yes	Yes
NM6	Yes		
NM 11			Yes
NM12		Yes	
NM18	Yes		

The only accurate reconstructions were the creations of S10, who claimed to be familiar with Puzzles 1 and 3 – she was the only candidate who recovered all three puzzles flawlessly. Interestingly, however, she acknowledged that a part of her (unexpected) success was due to 'luck;' in her own words, 'I have to say I am surprised - whilst I was familiar with a couple of the pieces I don't know them off by heart by any means, and there was almost definitely an element of lucky guessing involved.'

It is worth bearing in mind, however, that S10 has devoted time to studying syntax prior to starting her undergraduate degree. As she puts it,

With regards to structural thinking, all the nomenclature was unfamiliar when I came to uni and haven't ever been formally taught to think structurally, but I suppose I have spent lots of my own time looking into musical syntax. A few years ago I discovered the Bernstein 'Unanswered Question' lectures at Harvard, and became fascinated by the idea of music and language and have wanted to do a Masters degree on musical semiotics ever since (I'm a bit of a forward planner). I think that encouraged me to think about musical structure and to listen out for it whenever I listened to anything. This almost definitely, albeit subconsciously, played a part in my completion of the puzzles.²⁰⁶

Aside from S10, the only other noteworthy reconstructions among those familiar with any of the three puzzles are S3, S8, F3 and NM6's versions of Puzzle 1. S3 recreated a near-

²⁰⁶S10, 'Methodology', 21 February 2020.

perfect sonata, apart from the following inaccuracies: 1) the development is not grouped together – the reprise of the developmental theme is put as the penultimate clip, i.e. in the recapitulatory space; 2) the developmental reprise is instead replaced by the continuation of CI from S:V; 3) there are also some clips from S:I that have been wrongly combined within the expositional S-space, but this can be attributed to the candidate's relative pitching ability. In short, these results strongly suggest that being familiar with a piece of music does not translate to having a understanding of it, or being able to process the material critically instead of relying on memory.

S8's Puzzle 1 features a slightly inaccurate expositional S-space, and there is no symmetry in thematic presentation between the two outer sections. The tripartite design of the sonata form was correctly recovered; S8's formal understanding, however, is limited in places, suggesting that S8's work was driven more by his memory of the music, rather than an actual understanding or expertise in the area.

Table 11 S8's reconstruction of Mozart, second half

Clip	Sonata space	Formal function	
18	Expo	S CBI	
23	Expo	S CBI repeated	
8	Recap	S CI	
9	Recap	S continuation CI	
4	Expo	Cadence after OMT	
21	Expo	S continuation CI repeated	
19	Expo	S cadence OMT	
20	Expo	S postcadential	
5	Expo	Sequential thirds repeated	
25	Expo	End of	
31	Dev	Development	
3	Expo	Continuation of CI	Replacing reprise of the developmental

			theme
30	Dev	ReTR	
26	Recap	P	
6	Recap	P modified	
7	Recap	P cadential	
29	Recap	TR	
28	Recap	S CBI	
32	Recap	S CBI repeated	
2	Expo	S CI	
12	Recap	Cadence OMT	
33	Recap	S continuation of CI	
13	Recap	Cadence after OMT	
10	Recap	Postcad	
11	Recap	Sequential thirds repeated	
27	Dev	Development repeated	Partial reprise of the developmental theme
15	End	End	

NM6 reported that she has previously played this piece as part of her piano course. The reconstruction she provided is close to accuracy with a score of 78.1%. The exposition was perfectly put together, as was the second half of the recapitulation, i.e. the S-space in the tonic. Complications, however, started to be evident once the exposition had been completed: instead of moving into the developmental space, NM6 chose to recapitulate P-space immediately. Some might suspect that this is a case of miscommunication, where candidates mistakenly believed that there would be an expositional repeat – this was pre-empted and a specific line included in the list of instructions, notifying participants that there would be no repeats in any of the puzzles. NM6's mistake, then, strongly suggests a lack of understanding regarding sonata form. The table below shows the end of the exposition that leads into the premature recapitulation of P-space:

Table 12 NM6's reconstruction of Mozart, second half

Clip number	Sonata space	Formal function
25	Exposition	End of exposition
26	Recapitulation	P
6	Recapitulation	P modified statement-response
7	Recapitulation	Cadential
27	Development	Development repeated
30	Development	ReTR
20	Exposition	Postcadential and sequential thirds
31	Development	Development
10	Recapitulation	Postcadential
1	Exposition	Transition and I: HC MC
28	Recapitulation	S CBI

NM6's arrangement above implies the following:

1. The recapitulatory space has been split into two, with the first half prematurely presented right after the exposition has closed.
2. The developmental space effectively joins the recapitulation, making this sonata form a two- instead of three-part form.
3. The fact that the developmental theme is repeated was not recognised; NM6 instead fashioned an A-B-A model as seen in 27-30-20-31, i.e. the ReTR and postcadential passages are seen as continuation functions, after which the developmental theme is reiterated.
4. An alternative reading will be obtained should we decide to consider the placement of the developmental clips in light of the two that appear next: the postcadential and bifocal MC. I would argue that overall, NM6 has mistakenly taken the developmental space to be transitory music between the recapitulations of P- and S-spaces, as illustrated in Table 12. Effectively, there is no longer a separate developmental section

in this sonata reconstruction. What we have is a two-part sonata form: an exposition, which is immediately followed by a recapitulation with an extended transition courtesy of the misplaced development.

F3 made a very similar formal inaccuracy to NM6: having reconstructed a perfect exposition, he mistakenly recapitulated S:I instead of heading into developmental territory. In his answer, there are also a couple of stray PACs from P-space that found their way into non-P areas.

Table 13 F3's reconstruction of Mozart, second half

Clip number	Sonata space	Formal function
25	Exposition	End of
32	Recapitulation	S CBI repeated
8		S CI
9		S continuation of CI
12		Cadence OMT
22	<i>Exposition</i>	<i>P cadential</i>
31	Development	Development
27		Development repeated
30		ReTR
26	Recapitulation	P
6		P'
7		P cadential
29		TR
28		S CBI
32		S CBI repeated
24		<i>P continuation repeated</i>

The table above shows a partial recapitulation of S following the end of the exposition. This means that the recapitulation of S itself happens in two instances, each incomplete. The clips in italics show the stray cadences from P-space. These inaccuracies aside, however, F3's

reconstruction, like NM6, reflect their commentaries well. Interestingly, F3 noted that it was 'very difficult [to] piece together [the puzzle] as I know it well.'²⁰⁷

F3 and NM6's (mis)interpretations of Mozart's sonata strongly suggests that familiarity, even one that arises out of active engagement such as piano practice, does not necessarily translate to a complete understanding of the trajectory posed by the music at hand; in the case of sonata form, it seems that understanding of the symmetrical nature of the form is especially low.

3.2.2.1 Understanding music: the practical music lesson approach

In a personal exchange, NM6 recounted how her music teacher tended to focus simply on technical drilling, rather than combining it with theoretical application so as to ensure that she was cognisant of the underlying form of the music: 'My teacher just focused on drilling my technique; she expected me to know the theory [ABRSM Grade 5 Theory material] on my own.'²⁰⁸

This is not an uncommon phenomenon. In an article exploring the issue of performing from memory, Roger Chaffin et al. identify two types of memory: associative chains (unconscious) and content-addressable memories (conscious and likely to be language-based, i.e. '*that* such-and-such is the case'). Chaffin et al. acknowledge that 'associative chain is just the first step; much more work is needed to create a reliable, content-addressable memory.'²⁰⁹ The combination of the two, so they argue, creates a strong safety net on which performers can rely to help them recover should they experience a memory lapse on stage. Effectively, this refers to the presence of a mind map.²¹⁰ Of course, it should be acknowledged that the focus of Chaffin et al.'s study is memory in music performance, which is not similar to the

²⁰⁷F3, 'Methodology', June 2019.

²⁰⁸NM6, 'Methodology', 22 March 2020.

²⁰⁹Roger Chaffin, T. R. Logan, and K. T. Begosh, 'Performing from Memory', in *The Oxford Handbook of Music Psychology* (Oxford: Oxford University Press, 2009), pp. 352–63, 352-53, original emphasis.

²¹⁰ See Chapter 9 in Roger Chaffin, G. Imreh, and M. Crawford, *Practicing Perfection: Memory and Piano Performance* (Mahwah, NJ: Erlbaum, 2002).

task assigned in this project: the reconstruction exercise in this experiment could be described as a quasi-compositional endeavour. Nevertheless, Chaffin et al.'s findings regarding the workings of a musician's memory suggests that musical understanding does not necessarily translate to an understanding regarding form, i.e. a pianist may be able to internalise the various landmarks in a piece without comprehending why they occupy a particular position in a piece of music, just as how a participant can piece together two correct sequences without understanding why they occupy those positions. It has been suggested that expert performers organise their memory bank differently, using hierarchical schemata to convert newly acquired information to models that fit existing knowledge in the system, as well as to retrieve them.²¹¹

Apart from S10 and NM6, other candidates in the 'familiar' category performed much poorer; details of these can be seen in Appendices 3, 4, and 5.

3.2.2.2 Incorporation of music theory in practical class

Despite usually being advertised as a hand-in-hand endeavour, practical music lessons and music theory do not necessarily manifest in each other in real life. Of course, Grade 5 theory constitutes a widely disseminated body of information for music students around the world, thanks to examination boards stipulating that candidates for practical examinations of the upper grades, i.e. Grades 6 to 8, must have completed their Grade 5 theory examination. This does not necessarily translate to a conscious application of theoretical knowledge in playing, however.²¹² Pupils will not necessarily be aware of the presence of an augmented chord in a sequence they are practising, for example, let alone the presence of an overarching form such

²¹¹ See E. Tulving, 'Subjective Organisation in Free Recall of "unrelated" Words', *Psychological Review*, 69 (1962), 344–54; K. A. Ericsson and W. L. Oliver, 'A Methodology for Assessing the Detailed Structure of Memory Skills', in *Acquisition and Performance of Cognitive Skills*, ed. by A. M. Colley and J. R. Beech (Oxford: John Wiley and Sons, 1989), pp. 193–215.

²¹² It has also been suggested that extended exposure to any specific genre does not necessarily lead to a tendency to think about the content of the genre and how it works. See James D. Belcher and Paul Haridakis, 'The Role of Background Characteristics, Music-Listening Motives, and Music Selection on Music Discussion', *Communication Quarterly*, 61.4 (2013), 375–96, 390.

as sonata form; moreover, form is not a component covered in graded theory curriculum – teachers must take the initiative to introduce such concepts to their students, or have them playing various sonatas whilst never realising what a sonata actually is. In a study investigating teaching methods, a music teacher opined that 'I need [my pupils] to know where the augmented chord is and **the only way for me to expect [them] to know that is if I've actually taught it to you.**'²¹³ She notes that although some pupils will be able to recognise the presence of unusual harmony by ear, this intuitive learning is certainly not reliable for the masses. The implication, then, is that such theoretical knowledge and foundation needs to be explicitly instilled in students – in other words, a formalist approach is required.²¹⁴

Music students are often taught to practise in a way that will enable them to achieve the highest scores possible in graded examinations. Consequently, pupils are technically accomplished without understanding what they are playing, when in fact the most successful classical musicians are 'analytic and strategic, and they put considerable time and effort into deliberate practice, or training activities designed to raise their performance level.'²¹⁵ The emphasis on raising performance level often merely translates to technical accomplishment. In discussions surrounding music practice, being 'analytic and strategic' equals pinpointing areas in need of repeated and targeted practice so as to iron out problems; 'analytic' in this sense is not usually related to actual analysis the way known to academics – it has been noted

²¹³David Cleaver and Julie Ballantyne, 'Teachers' Views of Constructivist Theory: A Qualitative Study Illuminating Relationships between Epistemological Understanding and Music Teaching Practice', *International Journal of Music Education*, 32.2 (2014), 228–41, 231, original emphasis.

²¹⁴Cleaver and Ballantyne, 'Teachers' Views of Constructivist Theory', 231.

²¹⁵ See Susan Hallam, 'The Development of Metacognition in Musicians: Implications for Education', *British Journal of Music Education*, 18 (2001), 27–39; Debbie Rohwer and Jeremy Polk, 'Practice Behaviours of Eighth-Grade Instrumental Musicians', *Journal of Research in Music Education*, 54 (2006), 350–63; K. Anders Ericsson, Ralf Th. Krampe, and Clemens Tesch-Romer, 'The Role of Deliberate Practice in the Acquisition of Expert Performance', *Psychological Review*, 100 (1993), 363–406; as referenced in Hannah Smeltz, 'Reframing Student Practice to Facilitate Lifelong, Joyful Musicianship', *Music Educators Journal*, 99.2 (2012), 51–55, 52.

that the 'cognitive effort' expended in deliberate practice, i.e. systematic and purposeful practice, is linked to performance improvement rather than in-depth understanding.²¹⁶

It might be worth hypothesising that an increase in expertise would mean a more musically aware practice habit, i.e. one that is not so much concerned with technical precision as with aesthetics and inner structure. In a study investigating practice habits, Linda Gruson notes that novice students display a marked shift in practice pattern as their expertise increases: strategies employed during practice become more global.²¹⁷ Surface approach gives way to content-based learning as pupils become more advanced in their learning – students grow to define 'practising problems in musical rather than technical terms, although they were aware of the need to achieve automaticity in technical matters.'²¹⁸

Literature on music practice strongly suggests that 'error-detection ability and use of appropriate strategies [to remedy any errors] seem integral to high-level practice.'²¹⁹ Michael Hewitt once pointed out that younger students might find it challenging to find exactly the tactic needed to solve a particular problem area in pieces assigned, thus necessitating the guidance of teachers in lesson time.²²⁰ The role of instrumental teachers, then, is largely centred on assisting their charges in identifying challenging areas and solutions needed to overcome them – music lessons mainly deal with technical issues and not theoretical application.

²¹⁶Randy Hyllegard and Tamara L. Bories, 'Deliberate Practice Theory: Relevance, Effort, and Inherent Enjoyment in Musical Practice', *Perceptual and Motor Skills*, 107 (2008), 439–48, 439–40. Although this paper examines the relationship between enjoyment rate and deliberate practice, it strongly implies that the cognitive effort used in the latter is by and large related to learning new skills and honing existing ones. Even in the case of music practice, there is no mention of deep-level understanding of syntax.

²¹⁷Linda M. Gruson, 'Rehearsal Skill and Musical Competence: Does Practice Make Perfect?', in *Generative Processes in Music: The Psychology of Performance, Improvisation, and Composition*, ed. by John A. Sloboda (Oxford: Clarendon Press, 1988), pp. 91–112.

²¹⁸Susan Hallam, 'The Development of Expertise in Young Musicians: Strategy Use, Knowledge Acquisition and Individual Diversity', *Music Education Research*, 3.1 (2001), 7–23, 8.

²¹⁹Rohwer and Polk, 'Practice Behaviours of Eighth-Grade Instrumental Musicians', 352.

²²⁰ See Michael P. Hewitt, 'The Effects of Modeling, Self-Evaluation, and Self-Listening on Junior High Instrumentalists' Music Performance and Practice Attitude', *Journal of Research in Music Education*, 49 (2001), 307–22.

Although piece-specific familiarity does not guarantee accuracy, genre familiarity does assist with reconstruction to a certain extent. NM candidates who indicate a preference for classical music demonstrate a moderate awareness of formal functions, despite having no formal training and lacking elegance in their answers.

3.3 Duration spent

Duration spent on reconstruction the puzzles did not seem to be linearly related to the level accuracy.²²¹ This is congruent with Serafine, Glassman, and Overbeeke's finding: 'listening longer did not make identifying the correct structure more likely.'²²² The table below shows the average time taken by each group for each puzzle, which suggests the exact opposite of what has generally been held to be true by those who study the relationship between expertise and performance level:²²³

Table 14 Average duration (in minutes) to complete each puzzle

	Mozart	Beethoven	Haydn
S	99.5	111.91	45.33
F	170	70.83	41.67
NM	116.78	62.82	45.87

The hypotheses laid out in Chapter 1 mentioned, among others, that level of expertise would presumably correspond inversely to the time taken to reconstruct at least the Mozart sonata, i.e. the more knowledge a participant has of sonata form or Classical syntax, the less time he

²²¹ A similar observation has been made in a study relating to music discussion: 'It is interesting to note that it does not appear that time spent listening to any one specific genre led to discussion of music content. This may suggest that discussion of content is best predicted from background characteristics and motives rather than by time spent listening to specific music genres,' in Belcher and Haridakis.

²²² Serafine, Glassman, and Overbeeke, 'The Cognitive Reality of Hierarchic Structure in Music', *Music Perception: An Interdisciplinary Journal*, 6.4 (1989), 397–430 <<https://doi.org/10.2307/40285440>>, 404.

²²³ It is generally agreed that a higher level of expertise would result in an individual being able to extract and process perceptual cues more efficiently than those with less skills and experience, which ultimately reduces temporal constraints. See, for example, E. Buckolz, H. Prapavessis, and J. Fairs, 'Advance Cues and Their Use in Predicting Tennis Passing Shots', *Canadian Journal of Sport Science*, 13.1 (1988), 20–30.

would need to complete the first puzzle. Judging by the results tabulated above, this hypothesis has not been proven to be true. The time one needs to complete any particular puzzle does not seem to be influenced directly (or solely, at least) by the level of one's expertise. Neither does this time variable influence one's results – spending more time does not equal scoring better.

The following observations are also noteworthy:

3.3.1 NM candidates: duration taken

Eighteen NM participants yielded 50 reconstructions – some candidates did not complete all the tasks – out of which only 20% required more than 100 minutes to solve any of the puzzles assigned, and 28% more than an hour to do so. On the other hand, 26.47% of S candidates required more than 100 minutes and 58.3% of them required more than an hour; 33.3% of F candidates required more than 100 minutes and 40% of them required more than an hour to complete the puzzles. These figures are tabulated more clearly below:

Table 15 Candidates spending more than 100 and 60 minutes to complete tasks

	> 100 minutes	> 60 minutes
NM	20%	28%
S	26.47%	55.88%
F	33.3%	40%

Spending less time on these exercises also does not necessarily translate to worse performance – many a times, results from NM candidates show both lesser duration and higher scores (or at the very least, scores comparable to those obtained by S and F candidates).

Table 16 Comparison between time taken and sequential accuracy score

	Mozart		Beethoven		Haydn	
Ave. performance	Time	Score	Time	Score	Time	Score
NM	116.78	20.03	62.82	18.12	45.87	12.33
S	99.5	39.58	111.9	22.54	45.33	30.63
F	170	39.5	70.83	19.21	41.67	13.33

It is worth bearing in mind that the above table merely shows average points, which inevitably will favour S and F as these groups have fewer participants than NM. In Appendix 3, however, we can see that individual results often suggest that some members of the NM group scored higher and took less time to complete the puzzles than Music students.

3.3.2 F candidates: duration taken

A possible explanation for this phenomena can be deduced from examining F candidates' methodological reflections. In each commentary, the word 'syntax' or 'sonata form' is nearly always mentioned; only two candidates failed to do so. This strongly suggests that a higher level of training, which translates to the availability of a greater variety of knowledge, could mean two things: a more acute intuition and ability to analyse the syntax presented; which can mean that candidates spend more time mulling over the many permutations available to them before deciding on their answer.²²⁴ Meticulous yet laborious – this seems to illustrate the reconstruction process of the F group, which corroborates existing scholarship analysing the circumstances of an expert performance strategy: the more extensive knowledge bank possessed by an expert allows him to deduce and synthesise cues available to them such that

²²⁴ This paradoxical phenomenon has been noted by Yuval Noah Harari: 'Yet broadening our horizons can backfire by making us more confused and inactive than before. With so many scenarios and possibilities, what should we pay attention to?' Harari, *Homo Deus: A Brief History of Tomorrow* (London: Vintage, 2017), 461.

they can anticipate and predict future events better.²²⁵ Experts have also been shown to be more proficient at decision-making in their field and at predicting future events.²²⁶

Based on this reasoning, we can therefore make sense of the other side of the equation: because S and NM participants lack the level of sophistication that F group possesses, they have a more limited number of options to consider in reconstructing the puzzles, which effectively means that they likely did not need as much time to sift through alternatives as F did.

3.3.3 F candidates: duration between Mozart and Beethoven

Only F1 noticed that the syntactical construction in Beethoven's sonata was a lot more complex and unorthodox than that in the Mozart: 'I found this puzzle more challenging because I thought the piece was syntactically less predictable [than Puzzle 1], which prevented me from reaching a truly coherent solution.'²²⁷ F1's approach to Puzzle 2 was similar to that used for Puzzle 1, i.e. using syntax as the basis for analysing and reconstructing the clips.

Although not as explicitly stated in the manner of F1, F2 also suggested that the Beethoven sonata was built in such a way as to prevent him from applying conventional stylistic tools successfully. F2 'had sonata form in mind' when reworking Puzzle 1, but his approach towards Puzzle 2 was a lot more arbitrary – 'guessed quite a lot, not very satisfied

²²⁵K. E. French and J. R. Thomas, 'The Relation of Knowledge Development to Children's Basketball Performance', *Journal of Sport Psychology*, 9 (1987), 15–32; K. E. French, J. H. Spurgeon, and M. E. Nevett, 'Expert-Novice Differences in Cognitive and Skill Execution Components of Youth Baseball Performance', *Research Quarterly for Exercise and Sport*, 66 (1995), 194–201; S. L. McPherson, 'Tactical Differences in Problem Representations and Solutions in Collegiate Varsity and Beginner Women Tennis Players', *Research Quarterly for Exercise and Sport*, 70 (1999), 369–84; S. L. McPherson, 'Expert-Novice Differences in Planning Strategies during Collegiate Singles Tennis Competition', *Journal of Sport and Exercise Psychology*, 22 (2000), 39–62.

²²⁶K. Holyoak, 'Symbolic Connectionism: Toward Third-Generation Theories of Expertise', in *Towards a Generational Theory of Expertise*, ed. by K. A. Ericsson and J. Smith (Cambridge: Cambridge University Press, 1991), pp. 301–36; *Cognitive Issues in Motor Expertise*, ed. by J. L. Starkes and F. Allard (Amsterdam: Elsevier Science, 1993); A. M. Williams, K. Davids, and J. G. Williams, *Visual Perception and Action in Sport* (London: E & FN Spon, 1999).

²²⁷F1, 'Methodology', March 2019.

with my solution compared to the first puzzle'²²⁸ – which suggests that he realised, subconsciously at least, that the piece defied general sonata expectations.

Every F-candidate performed poorer accuracy-wise in the Beethoven compared to the Mozart; apart from F2 and F5, performance levels drop significantly:

Table 17 Sequential accuracy scores among F-participants

	F1	F2	F3	F4	F5	F6
Mozart	46.9%	59.4%	78.1%	18.2%	21.9%	12.5%
Beethoven	16.1%	48.4%	22.6%	3.2%	18.8%	6.25%

Originally, I suggested that completion time is inversely related to level of expertise; the results, however, suggest that they can be linearly related. In the case of this puzzle experiment, I would argue that this anomalous phenomenon could be attributed to the following reasoning: once candidates realise that the underlying conditions of the puzzle defied their expectations, existing knowledge as well as mental resources and skill set, they decided not to proceed further as the result would inevitably be sub-par either way. Furthermore, we should also consider the possibility that this reluctance to push themselves out of the way to solve the puzzle to a satisfactory level could also be motivated by the lack of a significant reward system, as well as lack of personal investment in the experiment.

3.3.4 Haydn: duration taken

This is a very time-consuming and mentally laborious task, and candidates have repeatedly submitted post-experimental feedback that voiced their dwindling motivation as they progressed through the study. This alone could stand as a reasonable explanation as to the phenomenon in question.

²²⁸F2, 'Methodology', June 2019.

As has been outlined in Chapter 1 and the first part of this chapter, the Haydn sonata was added to the equation following the first round of testing. Around half of the results obtained for this puzzle originates from a fresh batch of participants who had never before participated in the study; the other half of the results originates from those who had previously taken part in completing the Mozart and Beethoven puzzles. Not every first-round participant was able to be re-recruited for the Haydn. In the case of F1, F2 and F3, it was simply that they had graduated and left the University – their university contact details were therefore invalidated. All first-round S participants were approached for the Haydn, but only three of the original pool responded positively. The NM candidates were all willing to assist with this additional puzzle, but some were very quick to point out that this was solely due to their personal ties with me.

Learning from past mistakes, i.e. allowing the absence of time limit, I realised that such liberty actually contributed adversely to the overall setting as candidates became demotivated rather quickly and were prone to frustration and apathy from having to spend an excessive amount of time on a study that was not financially rewarding nor personally relevant to them. The solution was to provide a recommended duration of 45 minutes, although this did not always work out positively. Nevertheless, candidates were at least aware of the expectations underlying the tasks.

3.4 Confidence level

It was initially hoped that confidence level – 5 being the greatest and 1 the lowest – indicated by participants would provide a clue as to the nature of their answer. Before we look at the tables below, I would like to clarify that confidence level calculation has not been carried out with reference to a particular method. I have chosen not to calculate the number of 5's or the number of 1's present in an answer – I have simply relied on general patterning. There are two reasons behind this decision, with the first and main reason being that confidence level as

a measuring standard has turned out to be quite an arbitrary one: just because a candidate indicates a low confidence throughout does not mean that his answer is unsatisfactory, and vice versa. To be able to determine the real nature behind confidence level in this set-up, we would require a follow-up interview in which the participant gives a personal account of the various decisions made during the reconstruction process.

The second reason is that confidence level in this context has turned out to be more effective when used to profile the three demographic groups in order to provide a macro-level view of each group. This approach has resulted in the three tables laid out below.

3.4.1 Relationship between confidence level, demographic background, and perception of style

Using general patterning, I have interpreted candidates' confidence levels to profile the perceived difficulty levels of the three puzzles, the results of which are summarised in Table 18. A guide to reading the columns: M>B>H means that Mozart was perceived to be the easiest style to comprehend, followed by Beethoven, then Haydn; similar means no perceptible difference in difficulty was detected, judging by the confidence level submitted.

Table 18 Confidence level: stylistic differentiation

Confidence Level: composer and style					
	M>B>H	M>H>B	M>BH	B>MH	Similarx3
F	4	2	0	0	0
S	5	2	3	0	2
NM	2	1	5	2	7
Total	11	5	8	2	9

As Table 18 shows, most participants found that the Mozart was the easiest puzzle to crack, followed by the Beethoven, and then the Haydn. The second most popular perception was that all three puzzles were deemed to be of similar level of difficulty, closely followed by the third highest trend: Mozart as easiest over Beethoven and Haydn.

It is worth noting that as we descend the expertise ladder, we see more cases of being unable to differentiate between difficulty level and/or compositional style. This is perhaps only to be expected, for those with more awareness of Classical music and training in the analytical area would be more likely to recognise stylistic differences, formal, and functional manipulations. The lower down the expertise ladder we go, the greater and more varied the spread of participants, which suggests that expertise does influence the ability to distinguish stylistic traits. Most NM-candidates could not distinguish between Mozart, Beethoven, and Haydn, whilst the second highest majority could tell that Mozart was the more straightforward out of the three.

The three NMs who managed to identify $M > B > H$ or $M > H > B$ are the following individuals: NMs 2, 11, and 14. NM2 has the highest level of musical training: she plays three different instruments and has had twelve years of instrumental training. Meanwhile, NM11 has five years of training in four instruments, and NM14 has none. All three, however, performed very well on the functional awareness front – NM 2 scored slightly above 60%, whereas NMs 11 and 14 above 80%. These data suggests the following points: 1) it seems that using confidence level as a measure of an NMs ability to perform stylistic differentiation is rather unreliable; 2) the presence or lack of instrumental training does not seem to influence confidence level; 3) nonetheless, functional awareness is present in NM candidates regardless of training and confidence level indicated.

3.4.2 Relationship between confidence level and formal awareness

Table 19 Confidence level: dip or similar performance

Confidence Level: dip or similar						
	Dip M	Dip B	Dip H	Similar M	Similar B	Similar H
F	6	4	2	0	2	1
S	13	8	5	0	4	3
NM	12	8	8	7	9	7
Total	31	20	15	7	15	11

'Dip' or 'similar': these indicate the extent to which confidence level fluctuates within a single answer. As it is unproductive to scrutinise every single answer, I have decided to highlight the two most visible patterns: 1) confidence level starts at 5, 4, or 3, and then proceeds to 'dip' either by the end of the first third of the answer, the middle, or the final third; 2) confidence level does not fluctuate wildly nor show any sign of significant period of dipping, in which case I consider it to be 'similar'. If an answer has a 'similar' confidence level throughout, this does not necessarily mean that numbers will not vary, neither will it only vary within a close range. Similar confidence level can mean that an answer is dominated by 2s and 1s throughout, but it can also mean that there is no sharp decline as the answer progresses, that any changes in confidence level are made subtly, such as 5-4-3-4-2-3-4.

The nature of the study itself demands a certain level of subjectivity, which rules out the possibility of strict patterning, at least within the context of the present study. It is likely that this could be mitigated in future research with the addition of a post-task interview, during which candidates could be asked to clarify their responses and ratings.

There are several things relating to formal awareness that we can glean using this perspective. For a start, we see in Table 19 that the lower down the expertise ladder we go, the more 'similar' ratings we get. This indicates that candidates with less expertise found the puzzles challenging throughout. The presence of a 'dip', on the other hand, indicates that the candidate at least started off rather confidently – he could at least identify an appropriate opening section. It is therefore unsurprising to see that the more expertise a candidate has, the more likely he is to exhibit a 'dip' in performance rather than remaining 'similar' throughout.

A second observation that can be made is that most candidates agreed that the level of difficulty, in increasing order, is as follows: Mozart → Beethoven → Haydn. We see that the highest number of 'dip' cases is applicable to the Mozart, followed by the Beethoven, and

then the Haydn. In the case of 'similar' performances, however, candidates seemed to think that the Beethoven was slightly more challenging than the Haydn. As was the case in the previous sub-section, it does not seem that expertise has any bearing in this context: candidates who demonstrated 'similar' performances in the Beethoven come from various training background. It is possible that this phenomenon is the result of a more subjective cause, one that would have benefitted from a post-task interview.

The third conclusion that can be drawn from Table 19 is that most candidates found formal geography a challenge. Notwithstanding expertise in analysis, negotiating and reconstructing sonata form – or perhaps even a tripartite form – is not at all straightforward. In particular, candidates found it difficult to come up with a coherent middle section. Opening and ending sections seemed to be less of a challenge, with many assigning a 3 or more in said parts before dipping into lower numbers for the rest of the answer.

3.5 At a glance: comparing functional and formal awareness across pieces

Functional awareness in this case refers to the ability to recognise a formal function hinted in a clip. Formal awareness refers to the ability to process the clips collectively to make a formally sound piece of music – in the context of this experiment, formal awareness is judged by the ability to reconstruct the hidden sonata form. Formal awareness is denoted by *sequential accuracy*, inasmuch as a sequentially accurate arrangement would recover the original sonata form.

Seeing as very few candidates scored well on the sequential accuracy front, however, an alternative way to glean information relating to formal awareness is by analysing the series of melodic chains throughout the answer: these chains usually offer a clue as to whether the overall suggested form is strophic, tripartite (which would closely resemble the idea behind sonata form), or arbitrary, i.e. no specific form can be determined from the ordering of the chains. This approach is denoted as *functional accuracy*.

3.5.1 Calculation method

Throughout this results discussion, a multi-level perspective will be used to consider and analyse results based on the criterion at hand at any one time. Multi-level perspective simply means using different 'thinking caps' to view the same set of answers depending on the type of variable being analysed. By way of illustration:

1. When calculating functional awareness, points are given for the correct placement of a clip in the order initiation-continuation-cadential (ICC order). All three functions do not have to be present in the chain, but those present have to be in that order. Clips considered to be accurate under this calculation include those that are potentially misleading because of the way they have been written, i.e. Mozart's developmental theme belongs to the developmental space – continuatory – but it is very much an

initiation in its appearance; participants can acquire credit by nominating this clip either way.

2. When calculating functional misunderstanding (FNMA), however, it is not sufficient just to obey the ICC order: the clips used must not only obey the criteria present in point 1) above, but also belong in the correct sonata space – unlike in point 1), using Mozart's developmental theme as an initiation will be considered as a misreading under FNMA.

By employing this flexible approach, we can tackle both cognitive and analytical issues: point 1) takes the former into consideration, and point 2) the latter.

The details of individual scores can be found in Appendices 3, 4, and 5, where results are grouped according to the demographic division. By way of summarising these results, formal awareness score (sequential accuracy) is always lower than functional awareness, an observation that holds true for every single participant that has been recruited for this project.²²⁹ The tables below compare the functional and formal awareness scores for each group (all values are in %). They also indicate whether participants performed at markedly different levels from one puzzle to another – the last three columns show whether functional scores fall outside of the +/- 10% margin of error between any two puzzles.²³⁰ Having both M/H and B/H marked with 'Y' ('yes') may suggest the following line of argumentation:

1) Candidate performed wildly differently in terms of functional awareness in all three puzzles;

2) These contrasting scores strongly suggest that the Mozartean foundation was not recognised to be applicable as a foundation for the other two styles– in other words,

²²⁹ Bar S10, who scored perfectly for all three puzzles.

²³⁰ M/B is to be read as 'functional performance in Mozart versus functional performance in Beethoven,' and so on.

Table 21 Comparison of sequential and functional perception in S group

	Sq. A	Fn. A	Sq. B	Fn. B	Sq. C	Fn. C	M/B	M/H	B/H	MB/H
S1	81.3	90.6	22.6	64.5			Y			
S2	34.3	53.1	3.2	54.8	25	85		Y	Y	Y
S3	53.1	78.1								
S4	6.25	37.5	0.00	38.7	15	60		Y	Y	Y
S5	40.6	84.2	12.5	56.3			Y			
S6	15.6	43.8	19.4	74.2			Y			
S7	18.8	64.3								
S8	84.4	93.8								
S9	40.6	68.8	29	67.7	20	65				
S10	100	100	100	100	100	100				
S11	28.1	93.8	6.45	83.9	30	50		Y	Y	Y
S12	40.6	71.9	9.68	51.6	15	45	Y	Y		
S13	28.1	90.6	16.1	80.6	0.00	75		Y		
S14	12.5	43.8	6.45	71	20	60	Y	Y	Y	Y
S15	9.38	84.4	0.00	58.1	20	50	Y	Y		
									Total	4/9 = 44.4

Table 22 Comparison of sequential and functional perceptions in NM group

	Sq. A	Fn. A	Sq. B	Fn. B	Sq. C	Fn. C	M/B	M/H	B/H	MB/H
NM1	6.25	96.9								
NM2	34.4	68.8	19.4	67.7						
NM3	12.5	56.3	6.45	64.5	10	85		Y	Y	Y
NM4	15.6	84.4	9.68	54.8	5	25	Y	Y	Y	Y
NM5	0.00	62.5	0.00	54.8	15	65				
NM6	78.1	84.4	38.7	67.7	25	85	Y		Y	
NM7	9.34	78.1	16.1	61.3	10	80	Y		Y	
NM8	15.6	75	6.45	45.2	5	15	Y	Y	Y	Y
NM9	15.6	62.5	9.68	48.4	10	35	Y	Y	Y	Y
NM10	34.4	90.6	19.4	87.1	20	75		Y	Y	Y
NM11	9.38	81.3	0.00	90.3	10	70			Y	Y
NM12	28.1	78.1	83.9	93.5	20	75	Y		Y	Y
NM13	9.38	75	0.00	58.1			Y			
NM14	6.25	84.4	9.68	83.9	5	45		Y	Y	Y
NM15	18.8	78.1	6.45	77.4	10	45		Y	Y	Y
NM16	15.6	78.1	0.00	83.9	15	35		Y	Y	Y
NM17	15.6	75	6.45	74.2	15	65				
NM18	15.6	62.5	3.23	58.1	15	75		Y	Y	Y
Total										11/15 = 73.3

As we can see, every individual performed better in the functional category regardless of their expertise. This applies to all three puzzles, despite the obvious differences in syntactical difficulty.

At the bottom of Table 20,

Table 21, and Table 22 are tallies that show the number of participants who recognised the difference between Mozart-Beethoven and Haydn. The high proportion of such participants from each group strongly suggests that regardless of expertise, it is possible to discern the difference between Mozart-Beethoven syntactical camp and that of Haydn. This, then, supports one of my hypotheses, namely that Haydn stands apart from the stylistic school associated with Mozart and Beethoven.

There are marked differences between the three functional scores among F individuals, each time going over the +/- 10% margin. This phenomenon also exists in S and NM groups, but to a much lesser extent.

Table 23 Functionality between Mozart and Beethoven (marginal difference), Mozart > Beethoven

Variation in functional scores between Mozart and Beethoven in M > B order		
	Over the 10% margin	Within the 10% margin
F	50	50
S	50	50
NM	41.2	58.8

Table 23 shows that NM has a slightly higher proportion of candidates who stayed within the 10% margin of error, which suggests that there are more individuals in the NM group who were not quite successful in distinguishing between the styles of Mozart and Beethoven. In comparison, half of the population in F and S groups managed to do so, implying that formal theoretical training and stylistic exposure do make a difference in perceiving musical style.

Table 24 Functionality between Mozart, Beethoven, and Haydn (marginal difference)

Variation in functional score between Mozart, Beethoven, and Haydn		
	Over the 10% margin	Within the 10% margin
F	100 (2x M&B > H)	NA

S	100	NA
NM	100 (from M and B to Haydn) 80 (between M and B, i.e. M > B)	20% (between M and B, i.e. M > B)

Table 24 shows the functional performance across all three puzzles; this table shows the division in functional awareness within each group, i.e. the proportion of those staying within the margin of error, which is not shown as clearly in the three tables previously. As we can see, F and S groups display full scores of 100%. In the case of NM participants, only 80% managed to fulfil the assumption that Mozart, Beethoven and Haydn can be perceived to be different aurally: the remaining 20% failed to recognise the difference between the three. That said, the entire NM population seemed to be able to intuit that Mozart and Beethoven were more similar to each other, and that Haydn stood rather apart in this trio – 100% of participants showed the tendency to score similarly in Mozart and Beethoven before going on to perform much better or much worse in the Haydn.

Table 23 shows us that Music students were divided equally into those going over the 10% margin and those staying within, suggesting that both cohorts perhaps constitute students whose ability levels are split evenly. There is a greater difference among the NM individuals, however, which could mean that Classical syntax is less distinguishable to those not having theoretical and analytical knowledge through formal training. This notion is supported by the values shown in Table 23 and Table 24: we see how there is less of a difference in the NM scores, indicating that syntactical nuance is perhaps less perceptible to those without the knowledge necessary to distinguish between individual compositional style. Contrastingly, F and S students could detect each composer's syntactical idiosyncrasies better, as indicated by their 100% ratings for going over the 10% margins. With their formal exposure to Classical syntax and formal functions, F and S individuals were more able to distinguish between Mozart, Beethoven and Haydn.

There are two major combinations to be seen, the first of which is a bi-variable combination of Mozart and Beethoven, as well as Mozart and Haydn; the second is a tri-variable combination incorporating all puzzles. This distinction was made to accommodate the fact that the experiment had to be carried out over two rounds, with the Haydn constituting a later addition to the project: not all participants were able to do three puzzles, hence the need to provide two separate calculations.

The bi- and tri-variable calculations also provide a glimpse into performance reality in two separate settings – how Mozartean understanding fares when pitted directly against Beethoven or Haydn; and how the three syntactical signatures compare against one another. This two-step process allows us to investigate the reality behind the hypotheses on 'Mozart as the basis of our syntactical understanding,' as well as 'Mozart is the most straightforward style to comprehend in the so-called Holy Trinity of the Classical era.'²³¹

Table 25, Table 26, and Table 27 summarise the main findings regarding how Beethoven and Haydn fare when pitted against Mozart. Table 27 confirms one of the main hypotheses in this study, namely that Mozartean syntax is the easiest to perceive, followed by Beethoven's 'new path' and Haydn. In Appendix 6, I provide seven other tables that illustrate the various permutations of functional scores (all values are in %).

Table 25 Functional performance: M > B

Functionality M > B	
F	66.7%
S	58.3%
NM	94.1%

Mozart is understood to be easier than Beethoven by 66.7% of F, 58.3% of S and 94.1% of NM participants.

²³¹ Tia DeNora, *Beethoven and the Construction of Genius: Musical Politics in Vienna 1792-1803* (Berkeley: University of California Press, 1995), 2.

Table 26 Functional performance: M > H

Functionality M > H	
F	100%
S	77.7%
NM	60%

Mozart is understood to be easier than Haydn by all of F, 77.7% of S and 60% of NM.

Table 27 Functional performance: M > B > H (Mozart overall easiest)

Functionality M > B > H, i.e. Mozart is easiest overall	
F	33.3%
S	55.6%
NM	46.7%

Mozart is perceived to be easier than Beethoven, and Beethoven easier than Haydn, by 33.3% of F, 55.6% of S and 46.7% of NM.

Although the statistics presented in Table 27 support one of the main premises of this study, it must be emphasised that this is based on the majority of results and on the pieces used in this study – under no circumstance does the author claim that the level of syntactical difficulty for the three composers is always in the Mozart → Beethoven → Haydn order. Further comparisons between perception of syntactical difficulty and demographic groups can be found in Appendix 6.

It is also worth noting that the notion that Mozart is the easiest to overall does not seem to apply to F candidates – it applies most strongly to S and is somewhat true for NM. This could be because F candidates, with their higher expertise, wider knowledge base and exposure to a greater variety of music, have a much bigger pool of alternative perspectives to

consider. Consequently and rather paradoxically, this may well mean that a straightforward case does not immediately appear as such – the many alternatives in fact serve to obscure, not enhance, clear-cut ideas ('choking' mechanism in expert performance).²³²

Another useful tool by which we can measure functional awareness among candidates in this context is by investigating the rates at which candidates misinterpret a certain function for something else, i.e. when an initiating function, such as the statement of P-theme, is mistaken for continuation function. I have termed this functional misunderstanding (FNMA). Table 28 illustrates this data set for all three demographic groups for all three puzzles:

Table 28 Individual FNMA scores within each demographic group (continued over the page)

	Mozart	Beethoven	Haydn
NM1	31.3	NA	NA
NM2	46.9	41.9	
NM3	59.4	54.8	35
NM4	50	48.4	60
NM5	37.5	48.4	35
NM6	9.34	38.7	45
NM7	40.6	45.2	55
NM8	43.8	45.2	50
NM9	40.6	41.9	40
NM10	34.4	38.7	60
NM11	46.9	41.9	35
NM12	43.8	16.1	50
NM13	50	48.4	
NM14	56.3	51.6	45
NM15	59.4	48.4	55
NM16	43.8	48.4	45
NM17	40.6	41.9	45
NM18	40.6	48.4	10

	Mozart	Beethoven	Haydn
S1	6.25	32.3	NA
S2	31.3	25.8	40
S3	18.8	N	
S4	3.75	29	45
S5	3.13	NA	NA
S6	34.4	25.8	
S7	12.5	NA	
S8	3.13		
S9	18.8	29	50
S10	0	0	0
S11	34.4	35.5	45
S12	31.3	38.7	35
S13	21.9	41.9	35
S14	40.6	35.5	40
S15	43.8	32.3	35

	Mozart	Beethoven	Haydn
F1	3.13	19.4	NA
F2	30	12.9	
F3	0	25.8	
F4	28.1	29	30
F5	28.1	16.1	30

²³² See, for example, Baumeister; Rob Gray, 'Attending to the Execution of a Complex Sensorimotor Skill: Expertise Differences, Choking, and Slumps', *Journal of Experimental Psychology: Applied*, 10.1 (2004), 42–54.

F6	43.8	23.8	35

To obtain this data set, each functional application in every answer was analysed and measured against three criteria: initiation, continuation and cadential. If an initiating function was placed in a way that contradicts its nature in the original script – if, like the example above, a statement of P-theme was placed as part of a continuatory phrase – it is taken to be a misinterpretation. The difference between FNMA and the functional awareness measurement discussed previously is that the latter allows for a broader range of interpretation. Under functional awareness category, there will be no penalty for deploying a developmental section as a continuation to a statement of P-theme; under FNMA, however, this will be inaccurate as a developmental section, despite displaying continuatory traits, essentially belongs in a very specific sonata space, and has to be recognised as such.

To sum up, then: functional awareness measures the general understanding of syntactical functions – the ability to recognise the three main formal functions as stipulated by Caplin in his theory; FNMA, on the other hand, looks at misinterpreted formal functions. In other words, then, FNMA takes functional awareness one level higher by considering recognition accuracy.

This is a sample Haydn FNMA analysis from an NM participant:

Table 29 Sample FNMA: NM14, Haydn

NM 14					
		Perceived wrongly as...			
		Pre-I	I	Cont	Cad
P	Stat				
	Resp		1		
	Cad				
TR			1	1	
MC				1	
EEC					
End of E					
Dev		1		2	
ReTR				1	
Seq Adagio				1	
ESC					
End					
Mult PAC					1
UE					1

- The response phrase to the statement of P-theme was wrongly identified as an initiation function instead of a continuation-cum-cadential.
- The transition was wrongly identified as an initiation and a continuation – interpretations, which, given the circumstances surrounding the clip, are actually understandable: presentational qualities dominate the start of this transitional phrase, and the very fact that this is a transition would necessarily require the presence of continuatory material. Nevertheless, the function of this clip is to bridge two different sonata spaces; this is marked negatively because NM14 selected it to be the middle section of a thematic phrase
- The MC was wrongly understood as continuatory. The nature of this MC does elicit many ambiguities – that it was interpreted as a continuation is not a surprising

phenomenon at all. It would have been more appropriate, however, to assign the label 'Pre-Initiation' or even 'Initiation' to this clip: its fanfare-like nature could be seen as a prelude to a fuller theme.

- Three developmental clips were misread as pre-initiation and continuation functions. The first instance is self-explanatory, and the second follows the thought process laid out earlier as regard the logic underlying FNMA.
- The retransition was misunderstood to be a continuation. Despite displaying continuatory behaviour, the retransition's prevailing dominant inclination would perhaps suit the label 'cadential' more than 'continuation' in the case of a misreading, inasmuch as the retransition implies the need for a resolution in the form of the recapitulation's tonic return. Again, as was the case with TR, a ReTR is not a continuation per se, but a bridging function that nevertheless displays traits that enable it to be grouped under the general umbrella called 'continuation.'

As shown by the FNMA values in Table 28, there exists a clear trend within each demographic group: the higher the level of expertise, the more varied the scores obtained. This observation is corroborated by the following standard deviation scores:

Table 30 Standard deviation for FNMA

	NM			S			F		
	A	B	C	A	B	C	A	B	C
SD	11.48	8.46	12.66	14.99	11.06	14.53	17.05	6.11	2.89

The greater score variation arguably indicates a greater acuity in detecting functions and creating combinations. Larger discrepancies between each puzzle can also be detected in S

and F groups, suggesting that expertise does distinguish performance – individual composing styles are more easily detected by those with more expertise.

Chapter 4: Statistical analysis

Following from Granot and Jacoby's papers, the histogram and string edit approaches have been used to analyse the results initially in a statistical manner. Both contain several different ways by which we can measure the distance between what the participants chose and the point of comparison (random distribution or another group of participants).

Four levels of accuracy have been devised to aid this statistical analysis:

1. Key: the accurate version as per the answer key
2. Desc: description – the individual puzzle segment that represents individual formal function
3. Intermediate: the inter-thematic level
4. Sonata space: exposition, development, etc.

4.1 Histogram approach

Two histogram-based approaches have been deployed:

- (a) A comparison of distribution of answers at each level to the random distribution of the same size, i.e. the actual distribution from the participants is being compared to a random distribution. The comparison between obtained distribution and random distribution was carried out using Fisher's exact test of distribution, from which the mean and median p values are drawn. The Fisher's test, a variant of chi square (X^2) analysis, was chosen on the grounds of the distributions at hand often having fewer

than five observations. To enhance reliability, this operation was carried out with the help of Monte Carlo simulation: 1000 random draws were made and compared each time. Results from these comparisons were then aggregated to obtain the mean and the median p values.

(b) A comparison of the entropy of the distribution between the obtained distribution at each level versus a random distribution at the same size at each level. Again, the comparison was done 1000 times and entropies of the distributions – described with medians (Entropy of choices, EC, and Entropy of Random, ER) – and were compared against each other with a t-test.

The tables were automatically generated and contain the following abbreviations:

Md = Median

M=Mean

EC=Entropy of the participant choices

ER=Entropy of the random distribution

T=t-test value

p-val related to t-test

Figure 18 Distribution comparison in Mozart

Md_pval	M_pval	Md_EC	Md_ER	T	p-val	Group	Level
0.046	0.098	3.264	2.585	40.769	<.001	F	Key
0.066	0.124	3.369	2.777	43.672	<.001	F	Desc
0.476	0.495	1.508	1.439	22.993	<.001	F	Intermediate
0.803	0.755	1.168	1.083	35.189	<.001	F	Sonata Space
0.400	0.417	4.652	3.700	95.211	<.001	S	Key
0.357	0.397	4.305	3.453	100.703	<.001	S	Desc
0.189	0.232	1.672	1.453	106.298	<.001	S	Intermediate
0.862	0.789	1.128	1.100	18.552	<.001	S	Sonata Space
0.022	0.040	3.606	4.170	-74.369	<.001	NM	Key
0.039	0.083	3.842	3.652	29.122	<.001	NM	Desc
0.368	0.396	1.564	1.450	61.668	<.001	N	Intermediate
0.821	0.745	1.134	1.108	23.756	<.001	N	Sonata Space

Figure 19 Distribution comparison in Haydn

Md_pval	M_pval	Md_EC	Md_ER	T	p-val	Group	Level
1.000	1.000	2.322	1.585	33.449	<.001	F	Key
1.000	0.977	2.585	1.585	41.737	<.001	F	Desc
0.753	0.708	1.018	0.966	-1.368	0.172	F	Intermediate
0.696	0.673	1.382	1.466	-22.032	<.001	F	Sonata Space
0.759	0.723	3.954	3.170	66.400	<.001	S	Key
0.669	0.624	3.499	2.838	51.976	<.001	S	Desc
0.270	0.292	1.262	1.056	94.763	<.001	S	Intermediate
0.712	0.681	1.521	1.475	35.633	<.001	S	Sonata Space
0.967	0.918	3.649	3.907	-38.134	<.001	NM	Key
0.689	0.628	3.253	3.247	3.535	<.001	NM	Desc
0.596	0.569	1.152	1.057	60.442	<.001	NM	Intermediate
0.727	0.702	1.489	1.476	15.196	<.001	NM	Sonata Space

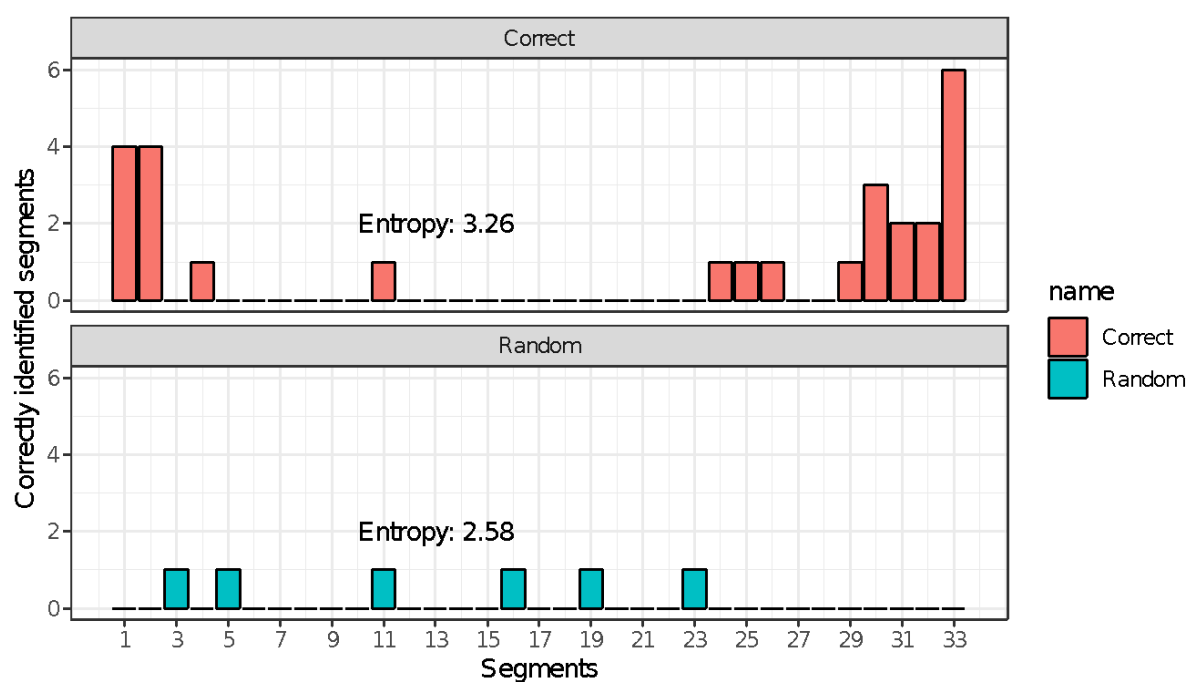
Figure 20 Distribution comparison in Beethoven

Md_pval	M_pval	Md_EC	Md_ER	T	p-val	Group	Level
0.152	0.212	3.057	2.585	29.324	<.001	F	Key
0.150	0.196	2.959	2.522	28.784	<.001	F	Desc
0.145	0.193	1.973	1.879	51.639	<.001	F	Intermediate
0.081	0.126	1.837	1.684	55.994	<.001	F	Sonata Space
0.821	0.797	4.613	3.459	100.969	<.001	S	Key
0.797	0.760	4.349	3.122	99.313	<.001	S	Desc
0.430	0.442	1.946	1.882	50.254	<.001	S	Intermediate
0.352	0.380	1.801	1.688	57.501	<.001	S	Sonata Space
0.114	0.160	3.805	4.087	-31.454	<.001	NM	Key
0.043	0.087	3.803	3.450	36.645	<.001	NM	Desc
0.127	0.173	1.955	1.886	65.734	<.001	NM	Intermediate
0.090	0.136	1.796	1.690	68.461	<.001	NM	Sonata Space

Based on the first columns, the small values (under 0.05) suggest that in some cases (F-candidates at the Key level) make different choices from the random distributions; furthermore, NM-participants make the choices better than by chance. In many cases, Md_pval does not really show differences from random selections.

The second measure was based on the entropy of the distribution, an approach that does almost always provide differences between random distribution and the actual choices (as measured by the t-test from the entropy values and based on the p-values that quantify the probability of the obtained t values, which are almost always below $p < 0.001$). The entropy values suggest that the actual choices of participants have higher entropy than the random distributions. This may appear to be counterintuitive, but by comparing correctly identified segments with random selections, which contain fewer correct responses and thus less entropy, a clear difference could be seen.

Figure 21 Entropy of distribution



The figure above reveals that it is the number of correctly chosen options that make the difference, which is to say that participants recognised the various degrees of form-functional importance at play in the puzzle instead of allocating the same level of priority to all the segments.

4.2 String edit approach

The second approach is the string edit approach, which involves transforming participants' answers into sequences of strings ('A', 'B', 'C', 'D', etc.) and calculating the distance between these answer strings and the answer keys. The calculation itself was based on optimal string alignment, also known as the restricted Damerau-Levenshtein distance. The string edit distance obtained was compared to a randomly sorted solution and this process was repeated 1000 times to obtain a distribution to which the values could be compared. In every category, it was found that participants completed their puzzles to a much better degree of accuracy than one would expect by chance. As can be seen from the tables below, the t-score in every scenario is very large, i.e. there is a great degree of deviation from the original random distribution to which each answer was being compared. T-score is inversely related to probability value, which means that the bigger the t-score, the smaller the probability of matching: participants were very much making deliberate, non-random choices in their answers. It is safe to argue, therefore, that participants recognised the underlying logic behind the puzzles regardless of their musical and analytical training background.

Figure 22 String edit for Mozart

Mozart			
T	p-val	Group	Level
-558.290	<.001	F	Key
-400.251	<.001	F	Desc
-227.898	<.001	F	Intermediate
-178.509	<.001	F	Sonata Space
-1159.849	<.001	S	Key
-732.594	<.001	S	Desc
-312.721	<.001	S	Intermediate
-245.217	<.001	S	Sonata Space
-491.670	<.001	NM	Key

-251.777	<.001	NM	Desc
-145.623	<.001	NM	Intermediate
-37.058	<.001	NM	Sonata Space

Figure 23 String edit for Haydn

Haydn			
T	p-val	Group	Level
-17.829	<.001	F	Key
22.351	<.001	F	Desc
-23.855	<.001	F	Intermediate
-425.154	<.001	F	Sonata Space
-274.189	<.001	S	Key
-168.002	<.001	S	Desc
-113.957	<.001	S	Intermediate
-147.747	<.001	S	Sonata Space
-90.800	<.001	NM	Key
-70.487	<.001	NM	Desc
-40.427	<.001	NM	Intermediate

-40.427	<.001	NM	Sonata Space

Figure 24 String edit for Beethoven

Beethoven			
T	p-val	Group	Level
-179.056	<.001	F	Key
-181.742	<.001	F	Desc
-80.293	<.001	F	Intermediate
-116.120	<.001	F	Sonata Space
-507.536	<.001	S	Key
-331.453	<.001	S	Desc
-133.768	<.001	S	Intermediate
-160.467	<.001	S	Sonata Space
-301.933	<.001	NM	Key
-167.255	<.001	NM	Desc
-140.235	<.001	NM	Intermediate
-148.234	<.001	NM	Sonata Space

The string edit approach shows S-group to have the highest score for every puzzle. They are followed by NM and F respectively. This means that S-group's answers reflect a higher degree of accuracy compared to a randomly generated answer – an encouraging phenomenon that suggests that puzzle segments do not carry equal probability of being chosen even when they are arranged in a random order. In other words, participants recognised that and displayed certain patterns in their answers that reflected the logic embedded in the music.

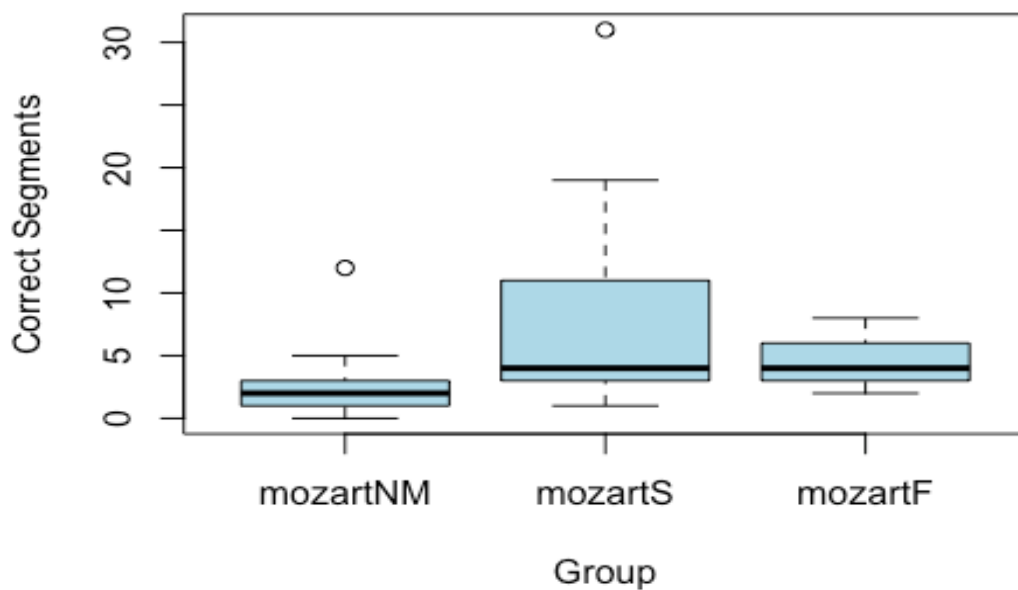
S-group's performance in this string edit approach also supports the argument given in the previous section, namely that their more intense exposure to Caplinian syntax allowed them to perform better than the untrained NM and the expert F who seemed to have experienced a greater degree of performance anxiety.

4.3 Comparison between the groups

For the purposes of this comparison, the number of correct responses, i.e. the number of measures, is calculated for each participant in a specific piece. Neither simulation nor comparison to a random permutation was used. Instead, the comparisons were done between summary measures from one group against another, i.e. normal inferential statistics were used to test whether the group mean values differ using ANOVA.

4.3.1 Mozart

4.3.1.1 Key level



Summary of correct responses per group

group	M	SD
mozartNM	2.50	2.73
mozartS	8.38	8.69
mozartF	4.50	2.17

ANOVA results

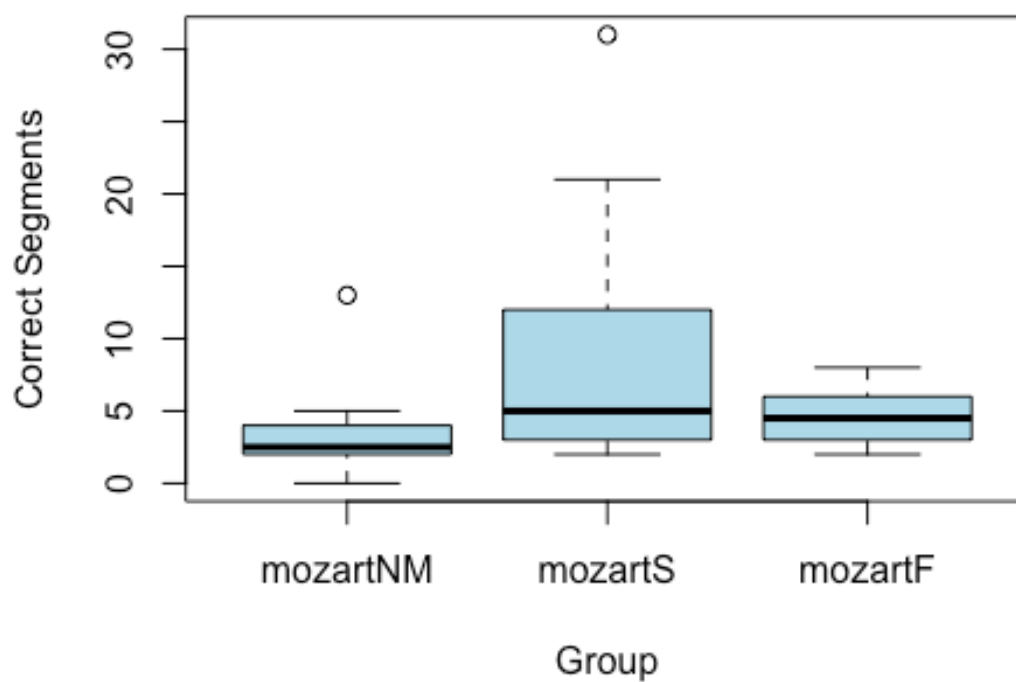
Effect	F	df1	df2	MSE	p	ges
Group	4.22	2	34	31.09	.023	.199

Tukey's post hoc test result

Group	Difference	Lower	Upper	p-adj
mozartS-mozartNM	5.885	0.911	10.858	0.017
mozartF-mozartNM	2.000	-4.441	8.441	0.729
mozartF-mozartS	-3.885	-10.628	2.859	0.346

ANOVA results, $F(2,34) = 4.22$, $MSE = 31.09$, $p = .023$.

4.3.1.2 Desc level



Summary of correct responses per group

group	M	SD
mozartNM	3.17	2.79
mozartS	9.08	8.72
mozartF	4.67	2.16

ANOVA results

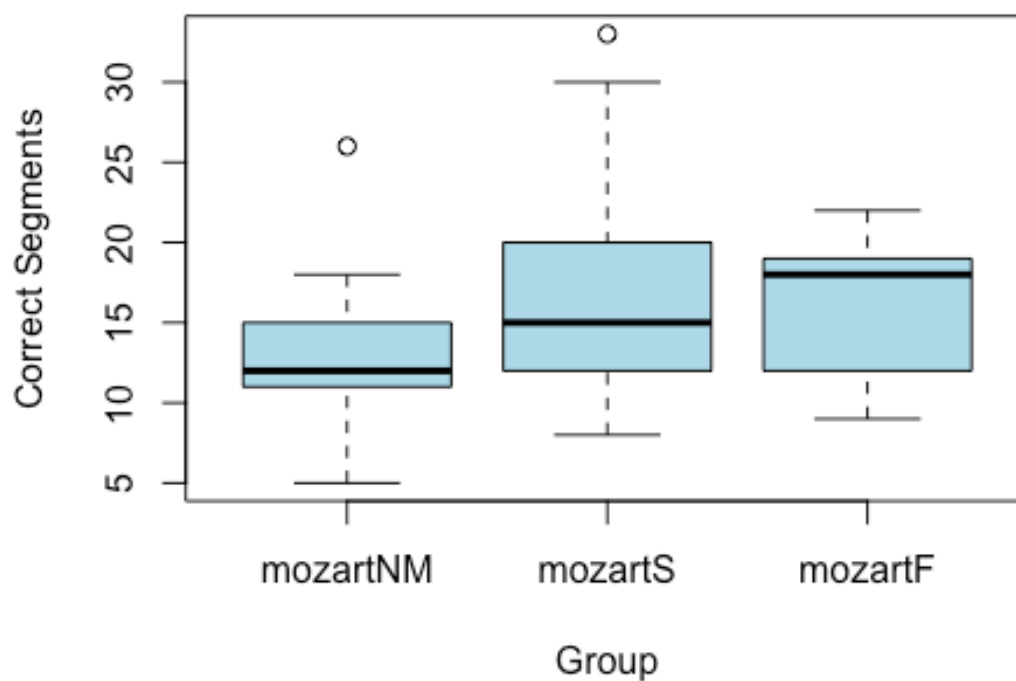
Effect	F	df1	df2	MSE	p	ges
Group	4.27	2	34	31.43	.022	.201

Tukey's post hoc test result

	diff	lwr	upr	p adj
mozartS-mozartNM	5.91	0.910	10.911	0.018
mozartF-mozartNM	1.50	-4.976	7.976	0.838
mozartF-mozartS	-4.41	-11.191	2.370	0.262

ANOVA results, $F(2,34) = 4.27$, $MSE = 31.43$, $p = .022$.

4.3.1.3 Intermediate Level



Summary of correct responses per group

group	M	SD
mozartNM	13.00	4.65
mozartS	16.92	7.59
mozartF	16.33	4.89

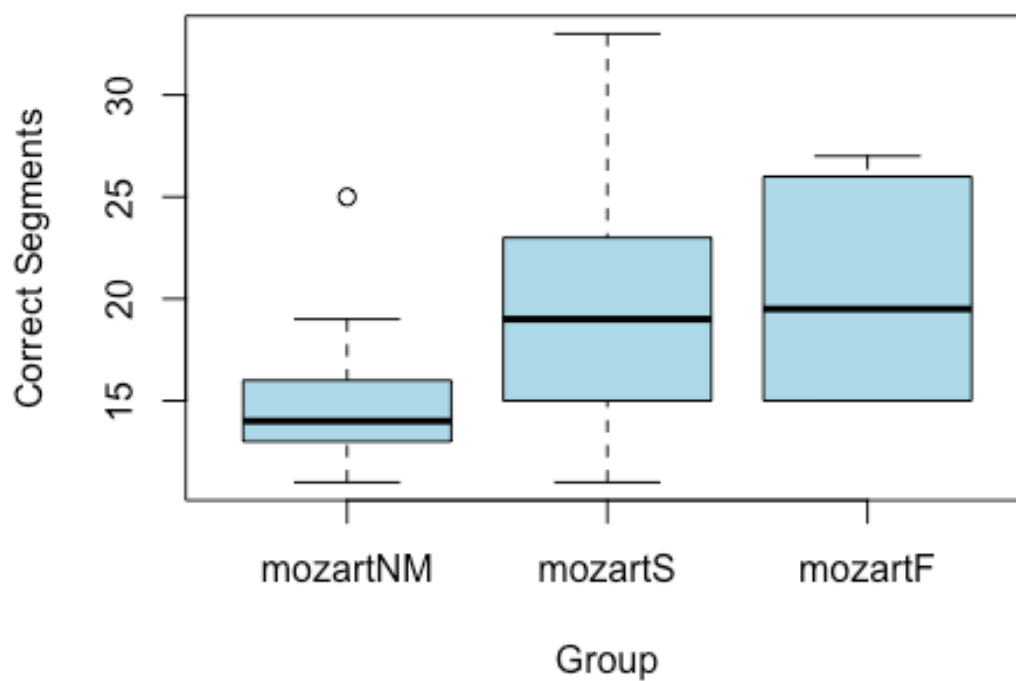
ANOVA results

Effect	F	df1	df2	MSE	p	ges
Group	1.88	2	34	34.65	.168	.100

Tukey's post hoc test result

	diff	lwr	upr	p adj
mozartS-mozartNM	3.923	-1.327	9.174	0.175
mozartF-mozartNM	3.333	-3.467	10.133	0.461
mozartF-mozartS	-0.590	-7.709	6.530	0.978

4.3.1.4 Sonata space level



Summary of correct responses per group

group	M	SD
mozartNM	14.67	3.43
mozartS	19.62	6.71
mozartF	20.33	5.92

ANOVA results

Effect	F	df1	df2	MSE	p	ges

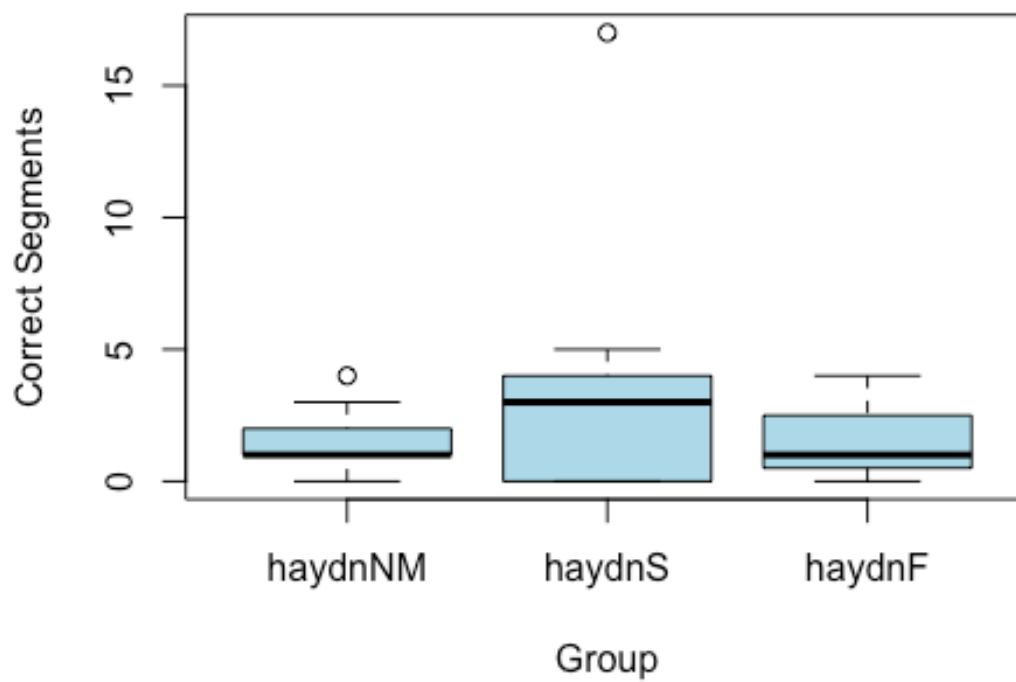
Group	4.63	2	34	26.95	.017	.214

Tukey's post hoc test result

	diff	lwr	upr	p adj
mozartS-mozartNM	4.949	0.318	9.579	0.034
mozartF-mozartNM	5.667	-0.330	11.664	0.067
mozartF-mozartS	0.718	-5.561	6.997	0.958

4.3.2 Haydn

4.3.2.1 Key level



Summary of correct responses per group

group	M	SD
haydnNM	1.40	1.18
haydnS	3.67	5.34
haydnF	1.67	2.08

ANOVA results

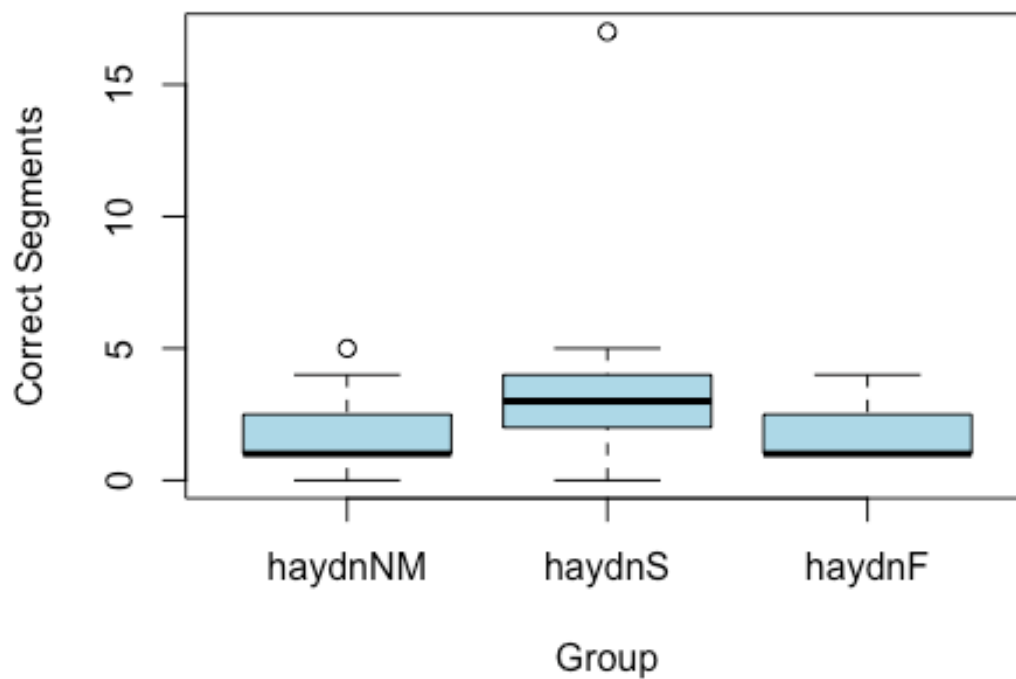
Effect	F	df1	df2	MSE	p	ges
Group	1.40	2	24	10.68	.267	.104

Tukey's post hoc test results

	diff	lwr	upr	p adj
haydnS-haydnNM	2.267	-1.174	5.707	0.247
haydnF-haydnNM	0.267	-4.894	5.428	0.991
haydnF-haydnS	-2.000	-7.440	3.440	0.634

ANOVA results, $F(2,24) = 1.40$, $MSE = 10.68$, $p = .267$.

4.3.2.2 Desc level



Summary of correct responses per group

group	M	SD
haydnNM	1.87	1.51
haydnS	4.11	5.06
haydnF	2.00	1.73

ANOVA results

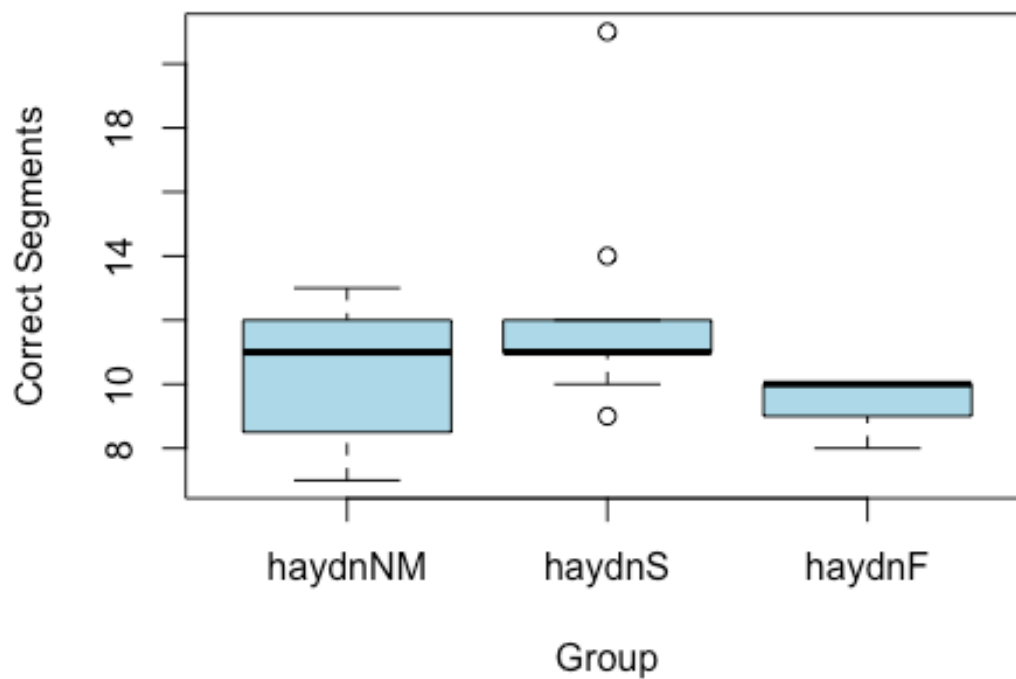
Effect	F	df1	df2	MSE	p	ges
Group	1.47	2	24	10.11	.250	.109

Tukey's post hoc test results

	diff	lwr	upr	p adj
haydnS-haydnNM	2.244	-1.103	5.592	0.235
haydnF-haydnNM	0.133	-4.888	5.155	0.998
haydnF-haydnS	-2.111	-7.405	3.182	0.586

ANOVA results, $F(2,24) = 1.47$, $MSE = 10.11$, $p = .250$.

4.3.2.3 Intermediate level



Summary of correct responses per group

group	M	SD
haydnNM	10.40	1.96
haydnS	12.33	3.54
haydnF	9.33	1.15

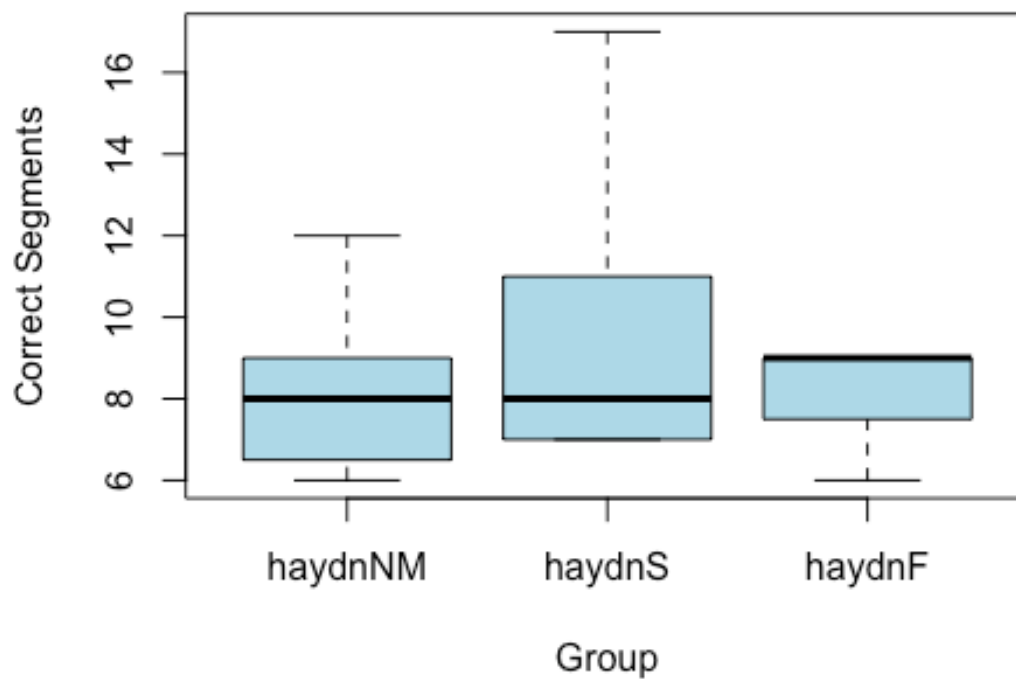
ANOVA results

Effect	F	df1	df2	MSE	p	ges
Group	2.27	2	24	6.51	.125	.159

Tukey's post hoc test results

	diff	lwr	upr	p adj
haydnS-haydnNM	1.933	-0.753	4.620	0.192
haydnF-haydnNM	-1.067	-5.097	2.964	0.788
haydnF-haydnS	-3.000	-7.248	1.248	0.203

4.3.2.4 Sonata space level



Summary of correct responses per group

group	M	SD
haydnNM	8.00	1.77
haydnS	9.89	3.44
haydnF	8.00	1.73

ANOVA results

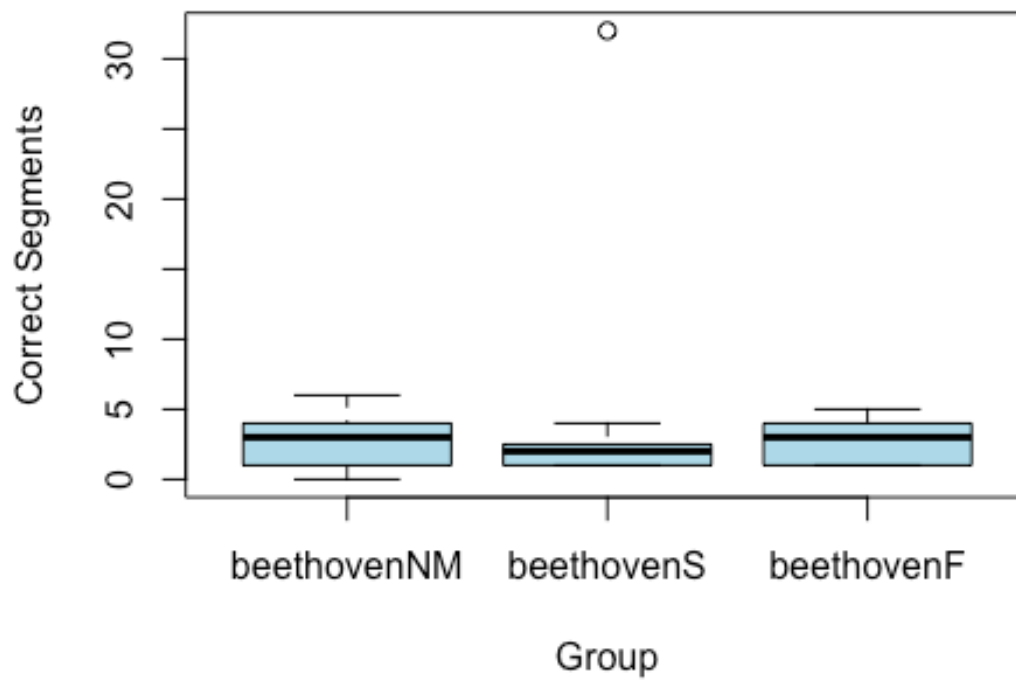
Effect	F	df1	df2	MSE	p	ges
Group	1.77	2	24	6.04	.191	.129

Tukey's post hoc test results

	diff	lwr	upr	p adj
haydnS-haydnNM	1.889	-0.698	4.476	0.183
haydnF-haydnNM	0.000	-3.881	3.881	1.000
haydnF-haydnS	-1.889	-5.980	2.202	0.492

4.3.3 Beethoven

4.3.3.1 Key level



Summary of correct responses per group.

group	M	SD
beethovenNM	2.41	1.91
beethovenS	4.64	9.12
beethovenF	2.83	1.72

ANOVA results

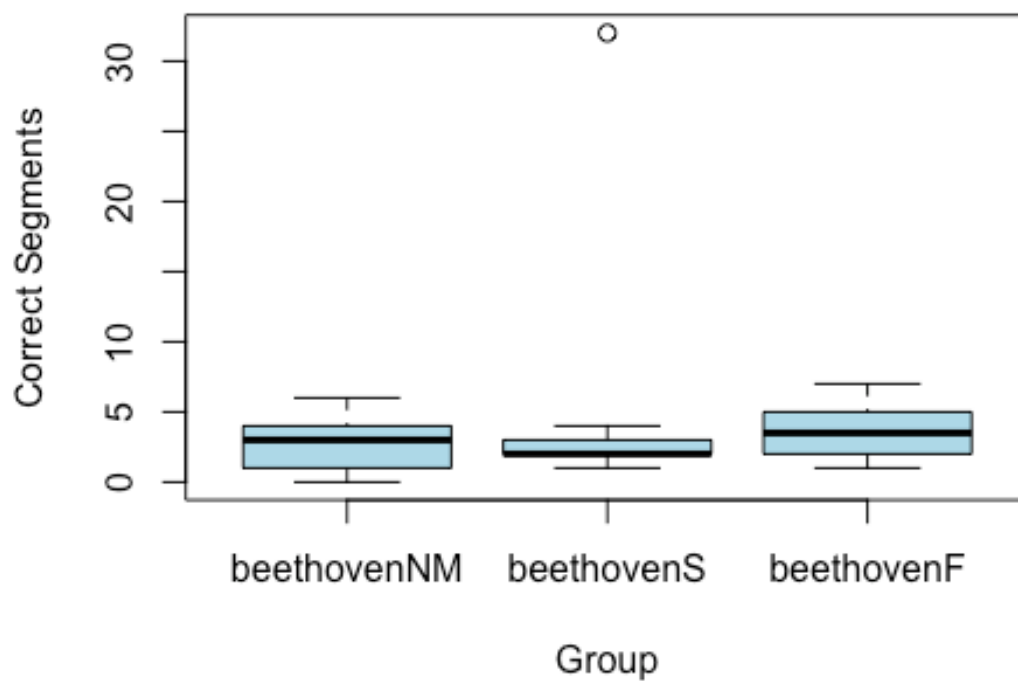
Effect	F	df1	df2	MSE	p	ges
Group	0.58	2	31	29.21	.564	.036

Tukey's post hoc test results

	diff	lwr	upr	p adj
beethovenS-beethovenNM	2.225	-2.923	7.372	0.543
beethovenF-beethovenNM	0.422	-5.895	6.738	0.985
beethovenF-beethovenS	-1.803	-8.554	4.948	0.790

ANOVA results, $F(2,31) = 0.58$, $MSE = 29.21$, $p = .564$.

4.3.3.2 Desc level



Summary of correct responses per group

group	M	SD
beethovenNM	2.59	1.73
beethovenS	4.91	9.03
beethovenF	3.67	2.16

ANOVA results

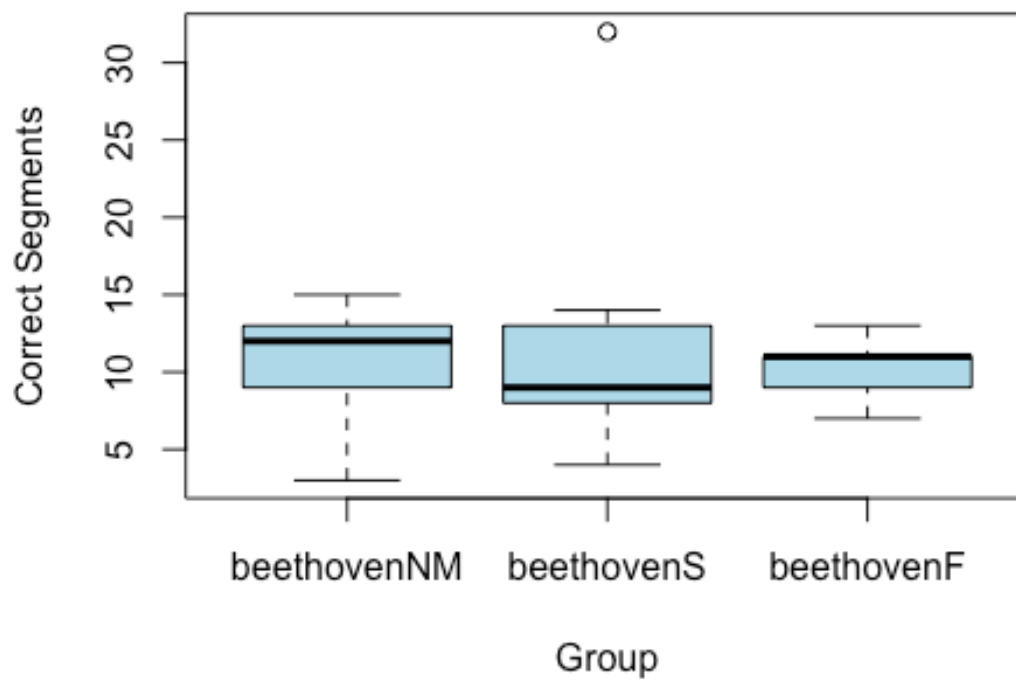
Effect	F	df1	df2	MSE	p	ges
Group	0.63	2	31	28.59	.539	.039

Tukey's post hoc test results

	diff	lwr	upr	p adj
beethovenS-beethovenNM	2.321	-2.772	7.413	0.508
beethovenF-beethovenNM	1.078	-5.171	7.328	0.906
beethovenF-beethovenS	-1.242	-7.922	5.437	0.891

ANOVA results, $F(2,31) = 0.63$, $MSE = 28.59$, $p = .539$.

4.3.3.3 Intermediate level



Summary of correct responses per group

group	M	SD
beethovenNM	10.59	3.43
beethovenS	11.55	7.46
beethovenF	10.33	2.07

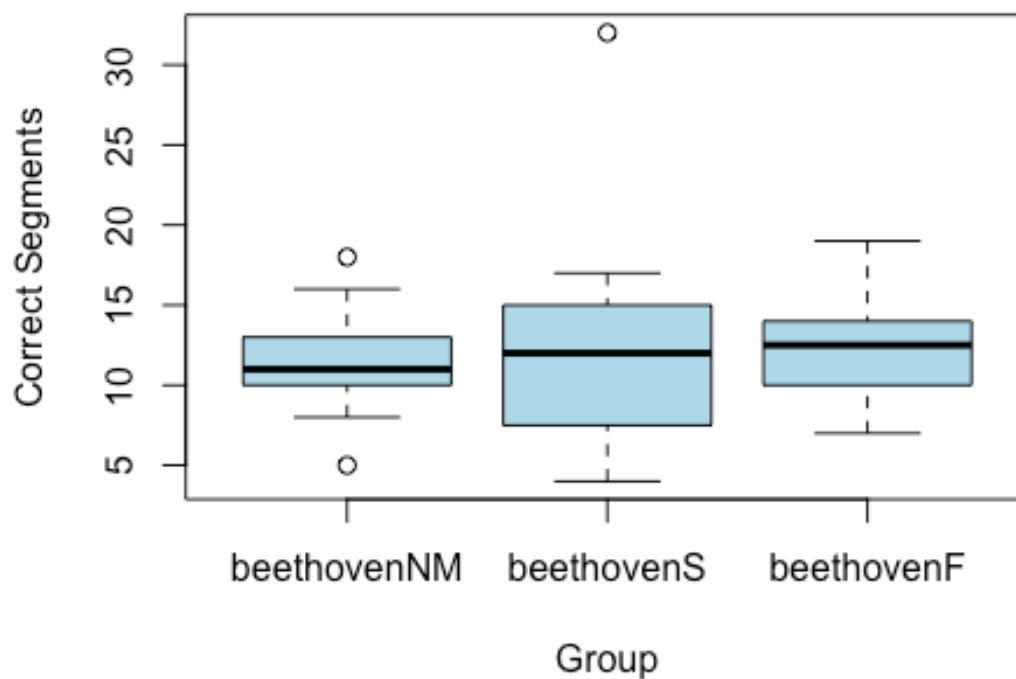
ANOVA results

Effect	F	df1	df2	MSE	p	ges
Group	0.16	2	31	24.72	.850	.010

Tukey's post hoc test results

	diff	lwr	upr	p adj
beethovenS-beethovenNM	0.957	-3.777	5.692	0.873
beethovenF-beethovenNM	-0.255	-6.065	5.555	0.994
beethovenF-beethovenS	-1.212	-7.422	4.998	0.881

4.3.3.4 Sonata space level



Summary of correct responses per group (Sonata Space level).

group	M	SD
beethovenNM	11.76	3.09
beethovenS	12.45	7.78
beethovenF	12.50	4.04

ANOVA results

Effect	F	df1	df2	MSE	p	ges
Group	0.08	2	31	27.07	.925	.005

Tukey's post hoc test results

	diff	lwr	upr	p adj
beethovenS-beethovenNM	0.690	-4.266	5.645	0.937

beethovenF-beethovenNM	0.735	-5.346	6.816	0.952
beethovenF-beethovenS	0.045	-6.454	6.545	1.000

4.3.4 Summary

The use of ANOVA to compare summary of measures proved to be most effective for the Mozart and least effective for the Beethoven – the latter yielded a flat plane of results across the three groups and sections. Applying this method of comparison to the Haydn showed ambivalent patterns that revealed no significant statistical differences between the three groups of participants.

For the Mozart, on the other hand, the comparison of measures returned significant differences between the groups: S-participants outperformed everyone on the individual puzzle segment and basic formal function levels, whereas F-participants performed significantly better than their counterparts on the sonata space level. These observations confirm the initial observations in Chapter 3, namely that S-participants, given their Caplin-heavy course content, would be more likely to process formal functions as they stand on their own; F-participants, on the other hand, would be more equipped with the skills to apply formal functional knowledge on a macro scale, i.e. to see the bigger picture.

Chapter 5: Initiatory and continuatory functions

5.1 Initiation-in-Continuation (IiC)

5.1.1 Definition

Inherently ambiguous clips are not the only ones that confound participants – instances of initiation, too, can give rise to incertitude. In this case, a notably common manifestation is having an initiation function in the middle of a series of continuation clips. A typical sonata form usually presents two clear-cut initiation functions in the form of the P- and S-themes, and this is the case with the Mozart and Beethoven; for the purposes of this project, the Haydn will be assigned just one clear-cut initiation function, i.e. its P-theme, inasmuch as there is no unanimous candidate for S-theme. Despite their nature, these initiating functions were revealed to be quite ambiguous to certain candidates, especially for NM participants.

Before we proceed into results analysis, I will introduce the two types of IiC I have designated for use in this project: true IiC and sequential IiC. I will now explain the criteria which I have used to analyse IiC's and enabled me to make this differentiation:

1. Sequential IiC is found when an initiation function is located after one or more continuation functions, thereby giving the impression that the music has embarked on a OMT procedure to repeat a previously encountered step.
2. True IiC is found when an initiation function is found following a sequential IiC. By way of illustration, in the case of 'I → Cont → I → I → I → Cont → Cad,' the second I would be categorised as a sequential IiC, seeing as it restarts the process of initiation, thus in a way restarting the phrase; the third and fourth I's, on the other hand, would constitute two cases of true IiC's.

It is essential, however, to note that there is a fundamental difference between true LiC's and a series of initiation functions stacked one after another at the beginning of a musical chain. Both phenomena are two of the more ubiquitous trends among the samples collected in this project. A true LiC requires a sequential LiC to have taken place, whereas a series of initiation functions at the beginning of a melodic chain are not considered eligible for this analytical criterion. A criticism that may be levelled against this argument is that the reasoning goes against the basic assumption underlying the very concept of LiC as a form of functional misinterpretation: an initiation function is followed by a continuation, and the two are concluded by a cadential. This is of course the basic model on which the majority of the Classical repertoire has been based; however, although most pieces feature one initiation function only at the start of a phrase, some showcase more, such as the first movement to Beethoven's Op. 31 no. 1. The S-theme in this sonata, as we have seen countless times and as I have explained in Chapter Two, consists of several layers of initiation function with the melody being stated multiple times in both soprano and bass voices.

5.1.2 Global summary of LiC events

Table 31 summarises the number of times whereby initiation functions were mistaken to be continuation, a phenomenon that lends its name to the sub-heading above:

Table 31 LiC cases in MBH

	NM	S	F	Total number of mistakes per type
Mozart P	3	3	2	8
Mozart CBI	33	17	7	57
Beethoven P	12	1	7	20
Beethoven S	15	11	3	29
Haydn P	11		3	14
Total per group	74	32	22	

The percentage scores for each of the findings above are represented below.

Table 32 IiC cases in MBH (%)

% of the total number of mistakes per type			
	NM	S	F
Mozart P	37.5	37.5	25
Mozart CBI	57.9	29.8	12.3
Beethoven P	60	5	35
Beethoven S	51.7	37.9	10.3
Haydn P	78.6		21.4

5.1.3 Individual demographic summary of IiC events

As we can see from Table 31 and Table 32, initiation functions were mistaken the most by the NM participants, followed by S and, finally, F groups. This finding is in line with the hypothesis surrounding expertise and performance. Exceptions to this trend can be found in F's misunderstanding of Beethoven's rondo theme as well as Haydn's P-theme.

There are only three F-candidates who attempted the Haydn, and their results are summarised in Table 33:

Table 33 IiC in Haydn by F group

Haydn: Misreading of initiation functions by F					
Candidate	Clip number	Theme	True IiC		Sectional IiC
4	19	P			Y
5	19	P			Y
6	8	P			Y
Total P		3	Total		Total 3

As clearly shown above, all three candidates made the same mistake once, with all three being sequential IiC's. The absence of true IiC could be attributed to the inherent properties of the music itself, which I believe still come across even after it has been segmented systematically: thematic economy seems to be an essential ingredient in this piece, and the ingenuity with which Haydn wields his limited amount of material has given rise to a musical trajectory that is full of ambiguity and blurred boundaries. As we will see later, true IiC – instead of sequential IiC – is a phenomenon that is observed quite frequently in music of a

more melodic nature, such as the Mozart and Beethoven.²³³ The lack of multiple initiatory functions stacked one on top of another in the Haydn, then, could well be attributed to the extremely finite initiatory clips available in this piece – if anything, the logistical limitation itself is already a deterrent for this multiple-function organisational approach.

5.1.4 IiC events for Beethoven: the ambiguous P- and S-themes

Below is a summary of cases of thematic misreading by F-candidates in the Beethoven:

Table 34 IiC cases in Beethoven by F

Beethoven: Misreading of initiation functions by F						
Candidate	Clip number	Theme	IiC		Sequential ²³⁴	
1	17	S			Y	
	8	P			Y	
4	8	P			Y	
	11	P	Y			
5	11	P			Y	
	16	S	Y			
	25	P	Y			
6	24	P			Y	
	11	P			Y	
	1	S			Y	
Total P		3	Total	3	Total	7
Total S		7				

There are more mistakes involving S-theme, despite the fact that it has been shown to be the more convincing candidate for main theme – there is a strong tendency across all three groups to place an iteration of S-theme at the head of their reconstructions. There are eleven initiation phrases in the Beethoven – five for the rondo theme (four cases of P: I and one case of P: flat-VII) and six for the S-theme – which translates to eleven opportunities to interpret the function correctly.

²³³ This is an argument that is only valid, at least for the time being, within the context of this experiment. Under no circumstances do I claim this to be a general observation that holds true to the Classical repertoire at large, or even to other compositions by Mozart and Beethoven. This proposition would benefit from further investigation.

²³⁴ For an explanation of the difference between true IiC and sequential IiC, refer to section 3.3.1.1.

Table 35 compares the perception of P and S by all three demographic groups:

Table 35 Misreading of P- and S-themes for continuation in Beethoven

Beethoven: Perception of P- and S-themes as Continuation		
	P as Cont	S as Cont
NM	14.1	14.7
S	8.33	12.50
F	29.2	6.25

In the case of NMs misinterpretation of P as continuation, the value of 14.1% in fact is a combination of two percentages:

- 13.2% of which belongs to the misreading of P: I as continuation
- 17.6% of which belongs to the misreading of P: flat-VII as continuation

$$\text{Percentage of misreading of P: I: } \frac{9}{17 \times 4} \times 100\% = 13.2\%$$

$$\text{Percentage of misreading of P: flat – VII: } \frac{3}{17 \times 1} \times 100\% = 17.6\%$$

The final total of 14.1% was derived using the following steps:

- Total possible iterations of P-theme in both keys in a piece: 5
- Total number of Beethoven participants in NM pool: 17
- Total cases of misreading of P in NM pool: 12

$$\text{Percentage of misreading in NM re P as Continuation: } \frac{12}{17 \times 5} \times 100\% = 14.1\%$$

5.1.5 The relationship between expertise and IiC events

An interesting observation from the table above is that NM-candidates perform more or less the same in terms of misinterpreting initiation for continuation – the two scores differ by only 0.06%. In comparison, there are more pronounced gaps between P- and S-related misappropriation by S- and F-candidates. Furthermore, it should be noted that the tendency of each group to misread an initiation for a continuation is comparable to their propensity to mistake the S-theme for the main material, as shown below:

Table 36 Misreading of S-theme for P-theme in Beethoven (%)

Beethoven: Percentage of candidates mistaking S-theme for P-theme	
NM	52.9
S	63.6
F	33.3

In both of these cases, S-candidates were the likeliest group to misread the S-theme as either continuation or the P-theme, followed by NM- and then F-candidates.

Let us start by considering the values in Table 35: we can see that NM misinterpreted both P- and S-themes at more or less similar rates – the probability of this event happening in such a group is therefore roughly equal.²³⁵ A possible explanation is that the lack of formal training in NM group put them at a disadvantage with regards to being able to discern the relative importance and status of the two themes in the global context of the piece. The two themes were likely to have been accorded similar privileges – they were both plausible initiation and continuation (or perhaps more simply, 'clips that can sound like both beginning and middle themes'). Consequently, the ordering of these clips in the reconstruction was not so much a concern as long as the finished product resembles an entity with a beginning, a middle and an end.

Building on this idea, then, it becomes possible to explain the performance of S- and F-candidates. S-candidates would largely rely on the knowledge received through systematic tutorial and drilling regarding the properties of initiation function as prescribed by Caplin.²³⁶ According to Caplin, of course, an initiation function would more likely consist of clearly defined material with a strong harmonic support that outlines the home key – properties that are present in the S-theme. Caplin's ideas are more easily applicable to Mozartean themes

²³⁵ All claims of this nature that are encountered throughout this project are valid given the parameters of this project only. They are not general observations of cognitive perception of Classical repertoire; further testing will be required for them to be so.

²³⁶ For details on the teaching procedure and syllabus for Analysis 1, please refer to the course handbook, which spells out the material taught in detail: https://duo.dur.ac.uk/bbcswebdav/pid-5458722-dt-content-rid-19754560_2/courses/MUSI1281_2019/Level%201%20Analysis%201%20Handbook%202019-20%285%29.pdf

than they are to Beethoven's 'new path' creations, which, as we know, upend conventions. Since they have only had less than a year's worth of training by the time they finished tackling these puzzles, they would likely not yet have the flexibility to negotiate the tricks and turns found in the Beethoven, thus resulting in various misinterpretations that are proportionally greater than NMs as seen in Table 35 and Table 36.

This would also explain their penchant for mistaking the S-theme to be the primary melodic material in the sonata. As Table 36 shows, S-candidates scored the highest in terms of mistaking S- for P-theme. Of course, the same argument could be applied to the NM demographic, whose score was second highest in terms of this misinterpretation: the fact that S- sounds more melodically stable than P-theme would have been a good rationale for them to pick the former to be the thematic backbone of the piece. Bearing in mind the higher tendency of S-group to mistake S-theme for continuation as well as the primary material, however, I believe the argument given regarding the nascent availability of analytical knowledge could be a viable explanation as regard S-group's results.

Sliding up the expertise scale, we have F-candidates who have had three years' worth of analytical experience. They mistook the P-theme to be continuatory 29.2% of the time, whereas the S-theme was mistaken for 8.33% of the time only. These results appear to be contradictory given that 33.3% of the population also mistook S to be the primary material. To present the conundrum in a different way, then: if the majority of the group did not misrecognise S to be P, why was P mistaken to be continuatory by such a wide margin (20.87%)?

With three years' worth of analytical training and experience, it is reasonable to presume that F-candidates would have encountered a wider variety of repertoire than have S-candidates.²³⁷ This means that they would likely not be too fazed by functional types that did

²³⁷ The breadth of repertoire covered in the three analysis courses can be found in their respective handbooks.

not easily fit into the Mozartean mould as prescribed by Caplin. If we extrapolate this reasoning to the results seen in Table 35 and Table 36, we can begin to understand why this expert group made less mistake when identifying the primary material of the sonata, i.e. two-thirds of the group did not fall for the melodic ruse presented by the S-theme.

There is, however, a danger that F-candidates could over-analyse given the breadth of their knowledge – this suggests the presence of 'choking' in expert performance. John Buchanan et al. discovered that 'choking' is observed in tasks that involve a dual-task procedure that directs attention, and not necessarily in mere rhythmic exercises, such as swimming with no outcome goal.²³⁸ The present study is a dual-task procedure: 1) the application of theory; in order to achieve 2) an aesthetically pleasing creation of a specific, although unspecified, type of music. Such a setting has been known to put experts under pressure and destabilise performance.²³⁹

Error! Reference source not found. shows a comparison (%) of S- and F-groups' misunderstanding of Mozart and Beethoven's P- and S-themes:

Table 37 Mistaking P- and S-themes for continuation in Mozart and Beethoven: comparison between S and F groups

Mozart	P as continuation	CBI as continuation
S	10	26.7
F	16.7	33.3
Beethoven	P as continuation	S as P
S	2.08	63.6
F	29.2	33.3

I argued earlier that S-candidates, having only received a Caplin-heavy curriculum at the time of participation, would have likely and largely based their answers on his principles. Caplin's principles are more amenable to Mozartean themes than Beethoven's 'new path' creations,

²³⁸ John J. Buchanan and others, 'Expert Monitoring and Verbal Feedback as Sources of Performance Pressure', *Acta Psychologica*, 186 (2018), 39–46 <<https://doi.org/10.1016/j.actpsy.2018.04.009>>, 45.

²³⁹ See K. J. Ashford and R. C. Jackson, 'Priming as a Means of Preventing Skill Failure under Pressure', *Journal of Sport and Exercise Psychology*, 32.4 (2010), 518–36; Gray; N. P. Kinrade, R. C. Jackson, and K. J. Ashford, 'Dispositional Reinvestment and Skill Failure in Cognitive and Motor Tasks', *Psychology of Sport and Exercise*, 11.4 (2010), 312–19; J. Toner and A. Moran, 'The Effects of Conscious Processing on Golf Putting Proficiency and Kinematics', *Journal of Sports Sciences*, 29.7 (2011), 673–83.

which is reflected in the results above. Firstly, we can see that an overwhelming majority of S-participants chose Beethoven's more melodic and stable S-theme to be the main theme in the sonata, which reflects Caplin's edict regarding the characteristics of a primary theme. This is also in agreement with existing scholarship on cognition: the influential Krumhansl-Schmuckler key-finding algorithm, for example, states that having a greater number of melody-note-count provides more context for the establishment of tonic key,²⁴⁰ which ultimately contributes to a more 'efficient encoding of melodies.'²⁴¹ As has also been discovered by Yune-Sang Lee et al., the process of encoding a melody is not only influenced by tonal context and duration,²⁴² but also changes in melodic structure.²⁴³ This also explains why there are more cases of CBI being mistaken as continuation (CBI has no tonic confirmation in root position). Secondly, we see that whilst S-candidates mainly chose S-theme to be the primary material, P-theme was also still taken to be a main melodic idea that is nevertheless not likely placed at the opening of the piece; this explains the low value (2.08%) in the tabulation. On the other hand, the more expert F-candidates seemed to have viewed this theme differently, with a higher number of misinterpretations being made.

It is worth noting that this type of misinterpretation was only found within the works of F's 4, 5 and 6 – in other words, final-year participants who were recruited in the second round of the experiment in November 2019, in the first term of their third year. When comparing their methodological reflections with those of the other half of the group, i.e. from March 2019, a striking difference can be seen: the first half contains specific references to form and syntax, which are not as obvious, or even absent, from the second half.

²⁴⁰ See C. L. Krumhansl, *Cognitive Foundations of Musical Pitch* (New York: Oxford University Press, 1990).

²⁴¹ Yune-Sang Lee and others, 'Melody Recognition Revisited: Influence of Melodic Gestalt on the Encoding of Relational Pitch Information', *Psychonomic Bulletin & Review*, 22.1 (2015), 163–69
<<https://doi.org/10.3758/s13423-014-0653-y>>, 164.

²⁴² For scholarship on the effects of tonal context and duration on melodic processing, see W. J. Dowling, 'Context Effects on Melody Recognition - Scale-Step versus Interval Representations', *Music Perception: An Interdisciplinary Journal*, 3.3 (1986), 281–96; Dowling and others.

²⁴³ Lee and others, 'Melody Recognition Revisited', 166.

Furthermore, the level of syntactical and formal awareness indicated by F's 4 to 6 is seemingly more basic than their counterparts. These two factors combined may suggest that the F group is divided into two tiers of understanding, with the majority of IiC misinterpretation occurring in the second half of the group. It seems, then, that mastery of syntax at a local level is not sufficient when attempting to tackle a large-scale puzzle such as the ones used in this study. Additionally, there is perhaps room to speculate as to whether the earlier recruitment timeline for the second half of F-group affected their performance in one way or another: F's 4, 5 and 6 might not have had as much time as the first three participants to internalise and apply the higher-level analytical thinking that was taught in Symphonic Analysis.

Correctly identifying the P-theme, however, is only the first part of the task – to be successful in reconstructing the Beethoven, one must also be able to parse the multiple initiatory functions available, a task that includes sifting between primary iterations and repetitions. Just because one (accurately) selected and placed a rondo iteration at the head of one's reconstruction, it does not follow that one has impeccable understanding of the overall role of this theme. The failure to realise the presence of a formal tug of war, i.e. between sonata form and sonata-rondo form, could result in an ambiguous treatment of P-theme: if sonata form is meant to have two themes, each of which appear twice, then what is the purpose of having five iterations of the same theme? As Malcolm Cole has pointed out, Beethoven's sonata-rondo is unlike the moulds he inherited from Haydn and Mozart: 'how dull it would be if all sonata-rondos . . . were predictable in content, proportion, and structure. [Beethoven's sonata-rondos are replete with] a multiplicity of experiments with techniques that produce irregularity and surprise'.²⁴⁴ The multiplicity of thematic statement in this piece

²⁴⁴M. S. Cole, 'Techniques of Surprise in the Sonata-Rondos of Beethoven', *Studia Musicologica Academiae Scientiarum Hungaricae*, 12.1/4 (1970), 233–62 <<https://doi.org/10.2307/901359>>, 235.

thus makes it not unlikely at all for candidates to misread initiation function as continuation, thus explaining the values found in Table 35 and Table 36.

An additional hurdle presented by the initiatory clips – both P- and S-themes – in this particular Beethoven sonata is the fact that some phrases begin as initiation and dissolve further down the line into a continuation: a prime example of this phenomenon can be found in Clip 6, for example, which features a repetition of the left-hand statement of S-theme; the same applies to Clip 16 – the recapitulatory counterpart to Clip 6. Another example of this observation is located in Clips 8 and 26 (refer to answer key): participants have to be able to understand that these materials lead to TR and, eventually, S-space. Additionally, it must be noted that Clip 8 is interchangeable with 11, 24 and 25, which effectively gives another layer of complexity to this dilemma. A very strong grasp of sonata form and mental flexibility are therefore essential to excel in this endeavour.

It is also intriguing to see that not a single first-year student, i.e. S-candidate, misread the P-theme from the Haydn. In discussing the relationship between duration taken to complete the puzzle and performance level earlier in this chapter, I noted that some S participants outperformed their F counterparts by a significant degree. A possible explanation suggested was that F-candidates, in having more expertise, would naturally have a bigger arsenal of knowledge – they would likely be more inclined to consider any single clip from a greater number of perspectives, compare them to previous case studies encountered, and deliberated more extensively. These factors would naturally contribute towards longer completion time; this methodical and highly rational approach, too, could have likely trumped musical instincts, which oftentimes could serve us better in music-making than logic could, leading to a poorer performance.²⁴⁵ The same line of argument could be applied to the anomaly at hand: S-participants managed to identify Haydn's initiation function better than

²⁴⁵ For example, see Koen A. Dijkstra and others, 'Deliberation versus Intuition: Global versus Local Processing in Judgment and Choice', *Journal of Experimental Social Psychology*, 48.5 (2012), 1156–61 <<https://doi.org/10.1016/j.jesp.2012.05.001>>.

their F counterparts because they had fewer variables to consider. Robert Glaser and Michelene Chi have pointed out that the depth of consideration given in a problem-solving exercise reflects the expertise at work.²⁴⁶ Cathrine Le Maistre, too, has argued that experts, unlike amateurs, are able to see right through to the deeper elements underlying a particular issue and to take into account various more aspects relating to the issue.²⁴⁷ Of course, this is not to say that those occupying the lower end of the expertise spectrum (in this case: S group) merely relied on instinct: if this was the case, the NM group would perhaps have done exceedingly well. Having some formal training in theory and analysis seemed beneficial – S performed better in functional identification than NM – but only to a certain extent, at least within the parameters of this study.²⁴⁸ This seems to be concurrent with the view held by cognitive psychologist J. L. Mursell, who proposed roughly three levels of musical understanding: the lowest focusing on dynamics and tone quality with little to no awareness of structure or design; the second level revolves around the sequencing of tonal patterns and melodic formation, as well as rhythm and harmony; and the highest level constitutes 'the general architectonic design of the music.'²⁴⁹

5.1.6 Relationship between compositional style and IiC

In my analyses of the Mozart and Beethoven in Chapter 2, I suggested that their S-themes may pose cognitive problems to participants due to their designs: the Mozart lacks a solid root-position tonic support in the bass that affirms its status as the S-theme, whilst the

²⁴⁶Robert Glaser and Michelene Chi, 'Overview', in *The Nature of Expertise*, ed. by Robert Glaser, Michelene Chi, and M. J. Farr (Hillsdale, New Jersey: Erlbaum, 1988), pp. xv–xvi.

²⁴⁷Cathrine Le Maistre, 'What is an Expert Instructional Designer? Evidence of Expert Performance during Formative Evaluation', *Educational Technology Research and Development*, 46.3 (1998), 21–36.

²⁴⁸It may be the case that such misunderstanding would not have arisen for experts provided the knowledge bank and skills possessed by said individuals are firmly immersed in their cognitive faculties. In other words, I am speculating as to whether the three F-candidates who attempted the Haydn sonatas had not yet had enough processing time to assimilate their analytical arsenal: the study was administered in the first two weeks of their third-year, and they returned their answers by the end of the first month, which likely meant that any new material or analytical skills learnt were still in their nascent stage. The ease with which analysts can navigate and process any material given to them undoubtedly comes from knowledge taught during their formal years of education, but the wealth of experience an analyst possesses also plays a major part in being able to parse an unseen piece of music successfully.

²⁴⁹J. L. Mursell, *The Psychology of Music* (New York: W. W. Norton and Company, 1937), 215.

Beethoven P-theme comes across rather weak in comparison to the more melodic S-theme – its stop-start persona lends it a transitory characteristic that is perhaps better associated with continuation function. Judging by the high rates of misunderstanding as displayed in Table 31 and Table 32, it can be concluded that these analytical observations stand true in the context of this empirical study. The Mozart CBI was mistaken for a continuation phrase 57 times, whilst the Beethoven P-theme was mistaken twenty times in total.

The Haydn, meanwhile, was misread 14 times – 78.6% of it can be located in NM answers. Whilst its P-theme is clearly the only viable candidate for the status of main melody in the piece, Haydn's overall writing style perhaps does not offer much help in anchoring this impression in the listener's mind: as I have argued previously, this sonata movement is rather compact, with many episodes seamlessly transforming into each other, resulting in a creation with oft-veiled demarcations.

By way of illustration, let us have a look at the second half of F5's Haydn reconstruction:

Table 38 F5 Haydn reconstruction, second half

Number	Description	Function
17	TR and MC	Pre-initiation
11	P-statement	Initiation
8	P-statement	
20	Dev P	Continuation
21	ReTR	
18	TR	
19	P-statement	Initiation
15	Dev TR	Continuation
13	Dev seq 2	
14	Close of exposition	Cadential

The highlighted row shows the out-of-place initiation function. Its location can lead to three interpretations: firstly, a genuine failure to recognise the nature of the thematic statement, leading to its misplacement; secondly, the lack of a contrasting S-theme inadvertently induced the temptation to use the only clearly melodic element in this sonata as a contrast

mid-section; and finally, a chain that consists of two separate sections – reminiscent of Schmalfeldt's OMT with its backing-up tactic – with Clip 19 as the barrier.

Table 39 and Table 40 give a summary of OMT-style IiC occurrences in all three pieces across all demographic groups:

Table 39 IiC OMT-style in MBH²⁵⁰

	Mozart		Beethoven		Haydn	
IiC type	True	Sectional	True	Sectional	True	Sectional
NM	12	24	11	19		11
S	4	15	4	8		
F	3	6	3	7		3
Total	19	45	18	34		14

Table 40 IiC OMT-style in MBH (%)

	% total					
	Mozart		Beethoven		Haydn	
IiC type	True	Sectional	True	Sectional	True	Sectional
NM	63.2	53.3	61.1	55.9		78.6
S	21.1	33.3	22.2	23.5		
F	15.8	13.3	16.7	20.6		21.4

A special note must be made for cases such as that found in Table 39: if an IiC occurs after a transition with an MC ending, or ReTR, it will be automatically considered as a sequential IiC, despite it being technically a functionally – and even at times sequentially – accurate.

To illustrate the concept of sequential IiC further, below is a case study based on F6's reconstruction of Beethoven's sonata; the portion summarised below is taken from the middle of the answer.

²⁵⁰ A detailed tabulated breakdown of cases of IiC can be found in Appendix 7.

Table 41 F6 Beethoven reconstruction

Initiation in Continuation – Beethoven		
Number	Description	Function
22	S: iii	Initiation
18	ReTR	Continuation
24	P	Initiation
2	MC	Continuation
4	Dev 4	Continuation
11	P	Initiation
14	MC	Continuation
15	Dev 1	Continuation
13	False MC	Continuation
1	S: VI	Initiation
28	Dev 3	Continuation
19	Coda 2	Cadential

The shaded areas represent instances of backing-up and restarting. The first shaded area, i.e. P, is considered a natural – in fact, accurate on both sequential and functional fronts – successor to the preceding clip, inasmuch as the two recreate the expected narrative between the end of the development and the start of the recapitulation. If this sequence was to be viewed from a wider angle, however, we see that textbook-style reading no longer makes sense. What we have in the tabulation above is the following functional cycle:

$$I \rightarrow \text{Cont} \rightarrow I \rightarrow \text{Cont} \rightarrow I \rightarrow \text{Cont} \rightarrow I \rightarrow \text{Cont} \rightarrow \text{Cad}$$

The cycle above essentially features a three-fold occurrence of OMT-style backing-up. This extended melodic chain, then, is strictly speaking not a single chain, but a four-in-one that fails three times at achieving cadential closure.

A case that stands out from the collection of IiC's is the ending to NM5's Haydn, where we find a combination of unfinished ending, leftovers and IiC: the final clip was given to the statement of the P-theme, i.e. the first half of the theme proper, following a mound of 'leftover' continuation phrases. This half clearly ends on an open-ended gesture, so its

placement does raise a few questions. The concept of 'leftovers' and 'pile-ups' will be covered in the later part of this chapter.

5.2 Continuation-in-Initiation (CiI)

If an initiation can be mistaken for a continuation, then the reverse is also possible. The tables below showcase the types of continuation phrases that were prone to be misread by participants, as well as the percentage calculations of such occurrences.

Table 42 CiI in MBH

Continuation in Initiation (CiI)											
Mozart				Beethoven				Haydn			
	NM	S	F		NM	S	F		NM	S	F
Total P cont	4	3		Total P cad			2	Total Resp	2	4	
Total TR	20	6	6	Total FMC	15	12	2	Total TR	15	5	4
Total CI	20	15	4	Total MC	10	2	2	Total MC	9	4	1
Total CI cont	8	6	1	Total Dev	27	12	5	Total EE	2		
Total Dev	23	12	3	Total ReTR	6		1	Total Dev	18	9	1
Total ReTR	4							Total ReTR	4	1	1
								Total Ada	3	3	1
Grand total	79	42	14	Grand total	58	26	12	Grand total	53	26	8
Total mistakes NM											190
Total mistakes S											94
Total mistakes F											34
Total all											318

Table 43 CiI in MBH (%)

Percentage values of CiI											
Mozart				Beethoven				Haydn			
	NM	S	F		NM	S	F		NM	S	F
Total P cont	5.06	7.14		Total P cad			16.7	Total Resp	3.77	15.4	
Total TR	25.3	14.3	42.9	Total FMC	25.9	46.2	16.7	Total TR	28.3	19.2	50
Total CI	25.3	35.7	28.6	Total MC	16.7	7.69	16.7	Total MC	17	15.4	12.5
Total CI cont	10.1	14.3	7.14	Total Dev	45	46.2	41.7	Total EE	3.77		
Total Dev	29.1	28.6	21.4	Total ReTR	10		8.33	Total Dev	34	34.6	12.5
Total ReTR	5.06							Total ReTR	7.55	3.85	12.5
								Total Ada	5.66	11.5	12.5

There is a visible trend regarding the chances of committing CiI across the three demographic groups, with expertise likely being the decisive factor in this context. There are far fewer mistakes in the trained groups than there are amongst NM candidates. Of course, it must be acknowledged that NM has the highest number of participants in this study; that said, it nevertheless is still logical to argue for the role of expertise in influencing one's ability to distinguish between initiation and continuation functions, as well as the ability to place them in their rightful places.

As per the hypotheses made in Chapter 2, candidates were prone to mistaking the types in *italic*, and I would posit that they were misread because of the reasons I provided in the previous chapter. The remaining clips and the reasons as to why they could possibly be misinterpreted will be discussed below, although there are those in this collection that cannot be explained from an analytical perspective – I would argue that they are, in other words, plain misunderstandings.

5.2.1 Continuation to P-theme in the Mozart

Alongside the retransition, this is the least mistaken of all the continuation functions listed in the table above. From the analyst's perspective, there is not much in this phrase that invites an initiation-leaning interpretation. Nevertheless, I would posit that the melodic quality of the continuation might have invited some candidates to think otherwise.

5.2.2 Retransition in the Mozart

Despite being supported by the prolongational and expectant dominant harmony, the right-hand still displays a noticeably melodic material, which could have contributed to the misreadings collected (albeit very few).

5.2.3 P cadential in Beethoven

Judging from their answers, candidates who placed the various cadential points in P-space as their opening gambits took these as pre-initiation material, i.e. as a kind of harmonic anacrusis, although these fragments are PACs and therefore complete themselves.

5.2.4 False MC

Similar to the PACs from P-space above, the misplacements of the false MC's in the Beethoven are reminiscent of harmonic anacrusis. This one, however, makes for a more convincing anacrusis inasmuch as there is actually an expectant pause at the end; in the original version itself, we see that the rondo theme returns by way of an answer to this questioning end.

There is room to suppose that the FMC can be perceived as rather fluid at best, or arbitrary at worst. S1 and S13's use of FMC (seen in Table 44), for example, suggest that the FMC was heard as continuatory; on the other hand, S11's placement of FMC post-ESC and pre-S implies a binary nature: half continuation or post-cadential, and half pre-initiation.

Table 44 Examples of misuse of FMC in Beethoven

S 1		S 11		S 13	
Clip	Desc	Clip	Desc	Clip	Desc
30	ESC	30	ESC	2	MC
29	<i>FMC</i>	29	<i>FMC</i>	3	<i>Dev 2</i>
21	P cad	17	LH S: I	32	P cad
		27	RH S: I	15	<i>Dev 1</i>
		24	Rondo	29	<i>FMC</i>
				21	P cad

5.2.5 MC, development and retransition

Apart from the first two sections in the development that begin as modified versions of P-theme and the dominant rush in the retransition that is akin to an extended harmonic anacrusis, there is arguably no concession available to the misreading of the MC, the third and fourth parts of the development.

5.2.6 Response on the dominant in Haydn

This is another possible case of initiation-like opening, much like the Mozart continuation above.

5.2.7 Development and retransition

All four segments from the development were involved in the CiI events. In the cases of the TR- and P-based developments, we can say that inasmuch as these start with initiation-like material, they could therefore be mistaken, if not momentarily, for initiation. The sequences and retransition, however, are arguably cases of plain misreadings.

5.2.8 Adagio with dominant preface

This can be mistaken to be a pre-initiatory material, what with its dominant underlay and the expectant pause at the end – it is very similar in kind to Beethoven's false MC. A good example of this would be F5's answer, which features this segment at the very start, leading into the statement of P itself.

In comparison to IiC readings, CiI would seem to be rather arbitrary. Bearing in mind that some continuation functions exhibited in this series of puzzles clearly do not belong at the start of a phrase – at least theoretically and analytically speaking, and also based on the judgment of an analyst as well as the results analysis of the majority – a simple explanation could be that some participants merely did not possess sufficient stylistic understanding to process these clips; alternatively, they were not motivated enough and gave up, and indeed this has been recorded by way of apology for poor performance by some participants.²⁵¹

²⁵¹ See Appendix 3 for methodology.

5.3 Leftover

5.3.1 Definition

It is little wonder that candidates often struggled with functional identification given the level of ambiguous writing found in all three pieces, even in the Mozart. This results in frequent cases of 'leftovers' and 'pile-ups'.

I use the term 'leftover' to denote clips that have been left as a lump at the end of the answer sheet, forming an open question with no closure whatsoever. As is the case with food, 'leftover' clips refer to those seemingly unwanted phrases whose status in the piece are unknown. Oftentimes, it is not even necessary to investigate these clips closely to decode the motivation behind such a move, i.e. leaving 'leftover' clips: a read-through the relevant methodological reflection usually suffices to inform us as to whether a candidate was wholly dumbfounded or simply decided to give up. This characteristic serves as a clue as to the nature of these clips: continuation. 56.2% of leftovers are continuation pieces. An example of such a lump can be found at the end of NM6's Haydn reconstruction:

Table 45 NM6 Haydn reconstruction, end of

Clip number	Sonata space	Description of clip
18	Exposition	TR
1	Recapitulation	Adagio sequence
7		MC
15	Development	TR
21		ReTR

As we can see, these clips do not a logical nor a musical sequence make. NM6 herself admitted that by the end, she had gotten thoroughly confused and decided to give up.²⁵²

The sub-heading above also mentions 'pile-ups,' a term which I use to describe an accumulation of one type of function, or more, that has seemingly arisen from either the

²⁵² Personal communication with NM6.

inherently ambiguous nature of the function in question, therefore leaving candidates perplexed. 'Pile-ups' can also refer to the mere fact that the sample in question was constructed by a candidate who had decided to give up towards the end (which, as in the case with NM6, could often be deduced from their methodological reflections). For the first reasoning, the inherently ambiguous nature of a certain function would have been previously discussed and hypothesised in Chapter 2. As is the case with leftovers, continuation function is also the main constituent in the case of a pile-up – 50.9% of pile-up cases involve continuation functions.²⁵³

5.3.2 Summary of leftovers and pile-ups

Below are two tabulations that summarise occurrences of leftovers and pile-ups in each three demographic group in each puzzle; another two tables will follow, displaying the total percentages of each type of leftovers and pile-ups across all demographic groups in all three puzzles:

²⁵³ I refer readers to my Mozart analysis in Chapter 2, in which I claim that certain gestures are inconclusive in nature and therefore likely to confound participants.

Table 46 Leftover in MBH

	Leftover Mozart							Leftover Beethoven							Leftover Haydn					
	Total	Cad	Cont	I	UE ²⁵⁴	Weak ²⁵⁵		Total	Cad	Cont	I	UE	Weak		Total	Cad	Cont	I	UE	Weak
NM	19	7	5	7	1	2		7	2	3	2	1			39	6	28	5	6	
S	8	3	5		1															
F																				
Total	27	10	10	7	2	2		7	2	3	2	1			39	6	28	5	6	
% out of total		37	37	25.9	7.4	7.4		% out of total	28.6	42.9	28.6	14.3			% out of total	15.4	71.8	12.8	15.4	

Table 47 Pile-up in MBH

	Pile-up Mozart					Pile-up Beethoven					Pile-up Haydn			
	Total	Cad	Cont	I		Total	Cad	Cont	I		Total	Cad	Cont	I
NM	46	18	20	8		7	2	3	2		54	12	36	6
S	33	14	14	4		7	2	5			6	2	4	
F	7	7				3	2	1						
Total	86	39	34	12		17	6	9	2		60	14	40	6
% out of total		45.3	39.5	14		% out of total	35.3	52.9	11.8		% out of total	23.3	66.7	10

²⁵⁴ Unfinished ending.

²⁵⁵ Refers to weak ending, e.g. using the dominant-based response from the Haydn P-space to end the entire reconstruction.

Table 48 Leftover and pile-up in MBH (excl. UE and weak E)

Total for	Leftover	Pile-up
I	14	20
Cont	41	83
Cad	18	59
Total	73	162

Table 49 Leftover and pile-up in MBH (%)

Total % for	Leftover	Pile-up
I	24.7	36.2
Cont	56.2	50.9
Cad	17.8	12.3

The details of each case of leftover and pile-up can be found in Appendices 8 and 9. In the meantime, these are sample cases of leftovers and pile-ups in each puzzle from the three demographic groups:²⁵⁶

Table 50 Leftover and pile-up samples in MBH (NMs 3, 14 and 5 respectively)

LEFTOVER		
Mozart: NM 3		
Clip number	Description	Description
17	P cad repeated	Cadential
30	ReTR	Continuation
19	S cad OMT: V	Cadential
20	S postcad: V	
24	P cont repeated	Continuation
26	P	Initiation
18	S CBI: V	
Beethoven: NM 14		
26	P cad: I $\Rightarrow$ TR Recap	Cadential $\Rightarrow$ Continuation
10	S: vi	Initiation
28	Dev 3	Continuation
2	VI: HC MC	
30	ESC	Cadential
25	Rondo	Initiation
29	False MC	Continuation
Haydn: NM 5		
21	ReTR	Continuation
15	TR-based Dev	
16	End of Recap	Cadential
14	End of Expo	
17	TR Recap	Continuation
18	TR Expo	
13	Seq 2 Dev	
20	P-based Dev	
19	Statement	Initiation

²⁵⁶ Leftover cases are only found in S 12 and NM-candidates. Seeing as the participant distribution is mostly homogenous, I have decided not to include S 12's Mozart leftovers in this table and chose another NM instead. S 12's complete reconstruction of the Mozart puzzle can be found in Appendix 10.

Table 54 Types of leftover in MBH (%)

Leftover in Mozart				Leftover in Beethoven				Leftover in Haydn			
	NM	S	F		NM	S	F		NM	S	F
P cad	5.26			ESC	14.3			End	11.1		
Postcad	21.1	12.5		P	14.3			EEC	2.78		
Sequential thirds	5.26	12.5		MC	14.3			P	2.78		
OMT	5.26	12.5		False MC	14.3			ReTR	5.56		
ReTR	5.26			Dev	14.3			Dev	27.8		
P Dev	5.26			S	14.3			Adagio	8.33		
Cont CI	10.5	25		P	14.3			MC	5.56		
CI		12.5						TR	22.2		
Dev	5.26	12.5						P	13.9		
TR		12.5									
P	10.5										
CBI	26.3										

5.3.3 Relationship between expertise and leftovers

Leftovers are not as common as pile-ups – a case of the former will invariably result in an unfinished ending, which is few and far between, and certainly is a phenomenon that is synonymous with the NM group. The breakdown of leftovers can be found in the tables attached in the appendix; unfinished ending will be covered later in this chapter. Those whose answers feature leftovers will undoubtedly also demonstrate signs of pile-ups, which will be discussed in further detail under the sub-section on pile-ups. On the other hand, pile-ups do not always translate to leftovers: sometimes, cases of the former arise due to candidate's inability to sift through a particular type of function, resulting in a group of it being dumped together towards the end of an answer, yet still finished with a cadential gesture. In the case of a leftover, however, no cadential gesture materialises, leaving an open-ended piece of music.

Within the parameters set in this experimental study, we can therefore conclude that those who have had formal theoretical and analytical training are likely not going to overlook the necessity of ending on a cadential gesture. There is only one S-candidate who fell into the trap of creating a leftover (and by default, an unfinished ending), and none from our most expert group. This supports existing scholarship on the understanding of the syntactic

function of cadence.²⁵⁷ Given the setting of the present study, understanding syntactical function is unlikely to be sufficient: syntactical function has to be integrated into a global structure, which is a challenging process that has been discussed by Michel Imberty in his 1969 study.²⁵⁸ Imberty investigated ten-year-old children's perception of closure in the dominant and closure in the tonic, and found that they prescribed equal harmonic weight to both cadences. Imberty argues that this is due to the inability of children to understand 'distant temporal relations . . . The present study [Tillmann et al.'s] adds new evidence that this inability does not simply represent a developmental problem, but a cognitive one as well. This conclusion is reinforced by the observation that musicians experienced the same difficulties as did musical novices, but to a lesser extent.'²⁵⁹ Results collected in the present study also support Tillmann et al.'s argument regarding expertise, cadential processing, and integrating musical function into a global structure.

Since cases of leftovers are inextricably linked to unfinished endings and cadential understanding, it will also be featured analysed in greater depth in the sub-section on cadential awareness.

5.3.4 Most common leftover scenarios

We can see that the most common leftover scenarios across the three puzzles seem to centre around three elements: the postcadential and CBI clips from the Mozart, and the TR and Development segments from the Haydn. In the Haydn tabulations above, 'development' encompasses all the four segments from the section, i.e. the TR- and P-based parts as well as the two sequential events leading up to the retransition. These findings corroborate some of the hypotheses made in Chapter 2, the first of which is that Mozart's CBI is not a solid

²⁵⁷Tillmann, Bigand, and Madurell, 'Local versus Global Processing of Harmonic Cadences in the Solution of Musical Puzzles', *Psychological Research*, 61.3 (1998), 157–74 <<https://doi.org/10.1007/s004260050022>>; Crystal Peebles, 'The Role of Segmentation and Expectation in the Perception of Closure' (The Florida State University College of Music, 2011), 171.

²⁵⁸M. Imberty, *L'acquisition Des Structures Tonales Chez l'enfant* (Paris: Klincksieck, 1969).

²⁵⁹Imberty's finding paraphrased in Tillmann, Bigand, and Madurell, 169.

enough candidate for S-theme, which is largely due to the lack of tonic confirmation in root position. Secondly, I also argued that the initiation-like starting points for Haydn's TR, TR- and P-based developmental sections might well mean possible misinterpretations by candidates in the reconstruction procedure – results shown in this analytical category seem to be in support of this prediction.

5.4 Pile-up

5.4.1 Definition

In the very first place, the concept of 'pile-up' was devised as an attempt to account for three types of event: 1) extremely long chains with no apparent coherence; 2) an ending that is excessively dominated by a particular function; 3) those whose methodological reflections suggest that they gave up rearranging due to the complexity of the puzzle, which likely translated to an unfinished effort with pieces that either had not been processed or half-processed, i.e. candidates were unsure as to the correct placement of said pieces and gave up. The first and third types are immediately suggestive of ambiguity-led confusion: candidates could not decipher the meaning of the clips at hand, resulting in them being grouped into one. Meanwhile, the second type of event is ever so slightly different: this could be caused either by ambiguity or a straightforward misunderstanding (candidate genuinely mistook a function to be something other than what it is, and not because the function itself appears misleading).

There is no way that we can precisely distinguish between these options, unless a post-experimental interview was conducted to ask candidates to justify their answers. Even if such a follow-up measure were to be put in place, there would still not be a guarantee that interviewees would be able to recount their decisions in a precise and definite manner: the use of intuition and musicality is not unheard of within the realms of musical comprehension

and processing. In fact, some of the best compositions and performances cannot be rationally parsed.²⁶⁰

5.4.2 Summary and sample of pile-ups

Table 55 Samples of pile-ups in Mozart (F4, S14 and NM18)

PILE-UP		
Mozart: F 4		
Clip	Description	Cadential
25	End of Expo	
15	End of Recap	
Beethoven: S 14		
3	Dev 2	Continuation
30	ESC	Cadential
28	Dev 3	Continuation
15	Dev 1	
4	Dev 4	
18	ReTR	
9	End	Cadential
Haydn: NM 18		
13	Seq 2 Dev	Continuation
12	Seq 1 Dev	
15	TR-based Dev	
1	Seq Adagio	
17	TR Recap	
18	TR Expo	Initiation
19	Statement	
20	P-based Dev	Continuation
21	ReTR	

Table 55 shows samples of pile-up scenarios, whilst the three tables below summarise the various cases of pile-ups, with each table showing the exact number and type of clips relegated to this role in each answer involved:

²⁶⁰ A more in-depth discussion on this topic can be found in Chapter 4, section 4.2.

Table 59 Types of pile-up in MBH (%)

Mozart				Beethoven				Haydn			
	NM	S	F		NM	S	F		NM	S	F
End	25	6.67	42.9	ESC	14.3	14.3		EEC	5.66		
Postcad	15.6	15.2		P cad	14.3			Closing	9.43	33.3	
OMT	6.25	11.1	42.9	Closing		14.3	33.3	Response	5.66		
Sequential thirds		15.2	14.3	Coda			33.3	ReTR	9.43		
ReTR	12.5			Dev	14.3	57.1		Dev	22.6		
Dev	6.25	11.1		False MC	14.3		33.3	MC	3.77	16.7	
TR		11.1		ReTR		14.3		Adagio	7.55	16.7	
CI	3.13	11.1		MC	14.3			TR	24.5	33.3	
Cont CI	15.6	15.2		Rondo	14.3			P	11.3		
P	3.13			S	14.3						
CBI	12.5	12.1									

5.4.3 Relationship between expertise and pile-ups

There is a very noticeable trend that is very likely due to expertise, namely that S and F groups are less prone to falling into the trap that is functional pile-up. Looking at the tables above alone will not do this observation justice – the pile-up data that is tabulated in full in Appendix 9 provides a much clearer angle from which we can observe this trend. Although the three demographic groups may seem to have performed equally at times (or in the case of F's Beethoven, worse than their less-expert counterparts), this is merely due to the fact that the number of candidates is not evenly distributed. In all three puzzles, the number of participants committing such mistakes is always highest in the NM group, followed by S and F, if any. In other words, the high percentage values for non-NM groups originate from the mistakes of three or fewer candidates, i.e. more concentrated distribution.

5.4.4 Most common pile-ups

From Table 56, Table 57, Table 58, and Table 59, we can easily see that the most commonly observed pile-up scenarios in the Mozart involve gestures from the cadential function, the continuation to CI and the CBI; in the Beethoven, it is the multi-layered coda, the false MC and development sections; whilst the Haydn developmental and transitional passages seems to have been the most ambiguous ones.

It is worth noting that although clips such as the 'end' in the Mozart are prevalent, this does not mean that they were used in an accurate, functionally correct or logical way. These clips were included in the pile-up calculation precisely because they were stacked one on top of another in a way that is suggestive of haphazard organisation. By way of illustration, the final segment of NM5's Mozart goes as follows: TR → ReTR → End:V → End:I → Postcadential:V. This is by no means the most radical example of a pile-up – it simply showcases how a seemingly accurate ending is in fact anything but in this context. The same argument is applicable to the relatively high figures seen in the F-column for Beethoven, as well as the S-group's treatment for the Beethovenian developmental sections.

Chapter 6: Cadential analysis

6.1 Non-cadential cadential

6.1.1 Definition and summary of non-cadential cadential

It has been observed that NM candidates in particular exhibited a tendency to place continuatory phrases in place of cadential ones at the close of their Haydn reconstructions. This phenomenon was not observed at all in the case of F group, and only twice among S participants with regard to the Mozart. Moreover, there are three cases of NM participants misplacing initiation phrases in place of cadential at the end of their reconstructions.

Table 60 displays the initiation and continuation phrases that have been placed mistakenly at the close of the third puzzle – the green boxes denote initiation and the yellow continuation:

Table 60 Non-cadential cadential MBH

Participant	Mozart	Beethoven	Haydn
S7	Incomplete - ReTR	NA	
S12	HC MC	Coda 3	End of exposition
NM3	CBI	Coda 1	End of exposition
NM4	+	Postcadential	ReTR
NM5	+ with postcadential from ESC	Coda 1	P
NM6	+	+	ReTR
NM9	CBI	+	Dev. seq. 2

NM14	+	False MC	MC
NM15	+	+	Dev. seq. 1
NM18	+	Coda 2	ReTR

6.1.2 Initiation-as-cadential

Let us start by discussing the three misplaced initiation phrases. As we can see in Table 60, both NM3 and NM9 have put the CBI from S-space in the Mozart as their ending, whilst NM5 plumped for the P-theme from the Haydn. I mentioned earlier that initiation phrases are not fully exempt from functional misinterpretation since a certain level of ambiguity surrounds some of the initiation phrases encountered in this experimental study: the S-theme of Mozart has its tonic harmony delayed until the continuation, which slightly destabilises its status; the P-theme of the Beethoven is jagged and not melodically stable; the Haydn, meanwhile, does not even seem to have a clear S-theme.

The last two pieces left in NM9's Mozart reconstruction are the CBI's – one from the exposition and the other from the recapitulation. Her reconstruction scored 62.5% on the functional accuracy front, and generally displays functional coherence. As is expected from an NM participant, there is no awareness of tripartite structure, let alone any sonata-led design principles; the most discernible form is strophic. Nevertheless, NM9 did not always manage to start each chain with an initiation phrase, and neither was she seemingly aware of the two-fold iterations of CBI in each case. This, of course, would lead to balancing problems, the details of which will be expounded in the sub-section on strophic form.

The same problem can also be observed in NM3's solution to the Mozart puzzle: this, too, is a strophic form-like construction, which nevertheless is less obviously structured as such as compared to NM9's. Both answers, however, suffer from the same issue that led to their having unused initiation phrases at the end: phrases do not always start with initiation

clips, a problem that is aggravated by the frequent use of two-clip chains that feature only continuation and cadential functions.

Proportion-related issues are also observed in NM5's Haydn answer. As are the cases with the two discussed previously, the shortcomings in this case study include the frequent use of multiple cadential functions stacked one on top of another, the tendency to start phrases with continuation clips, and poor thematic organisational skills. Bearing in mind the rather brief nature of this sonata, as well as the lack of obvious choice for secondary theme – which would have added to the arsenal of initiation phrases, therefore lending a slight assistance to the mix-and-match process – good thematic organisation and proportional design capability are all the more crucial.

In summary, then, the misplacement of initiation function at the end of an answer in the context of this experiment seems to stem from the following reasons: 1) poor thematic organisation; 2) inability to design a proportional form, resulting in clips of extreme length that lack initiation function; 3) the use of multiple cadential functions, one after another, leading to there being none left for the very end. Cases of initiation-as-cadential misreading only occurred in the Mozart and the Haydn, which is likely due to the over-availability of cadential function in the Beethoven; furthermore, only one type of initiation was misunderstood per sonata: the CBI from the Mozart – which could be due to its delayed tonic confirmation; and the P-theme from the Haydn that bears a heavier burden due to the lack of apparent S-theme in the sonata. For the latter, we also have to take into account the overall brief, fleeting and fragmentary nature of the music, which might have likely added to the ambiguity factor.

6.1.3 Continuation-as-cadential

On the other hand, there is a greater selection to be had from the continuation-as-cadential arsenal. From the table above, we can see that there are nine cases of such misinterpretation in total, and they can be broken down as follows:

- ReTR: 4
- MC: 3
- Developmental sequence: 2

For these nine cases, neither is more musically awkward than the other – they are all equally bewildering, as they render the music incomplete. In the cases of ReTR and MC, the music ends by hovering on expectant dominant harmony that demands to be resolved onto a tonic. There is a wealth of cognitive study that discusses listeners' tendency to expect dominant harmony to be resolved to the most stable of all harmonic shade: the tonic.²⁶¹ The final passage in a piece of music, by virtue of being the end, should ideally be the most stable point of arrival; the fact that some candidates left their endings unresolved is therefore intriguing.

6.1.3.1 Retransition

Retransition seems to be the most prevalent in this group. In an attempt to uncover a possible reasoning or two behind the use of these three functions at the close of the puzzles, I shall be approaching the following discussion from two angles: firstly, by looking at the overall structure presented by each participant; and secondly, by considering their ability at thematic organisation.

S7's Mozart answer is incomplete, which does mean that his placing of ReTR at the end cannot be taken at face value. Despite the incomplete status of S7's answer, the portion

²⁶¹ For example, see Petr Janata, 'ERP Measures Assay the Degree of Expectancy Violation of Harmonic Contexts in Music', *Journal of Cognitive Neuroscience*, 7.2 (1995), 153–64 <<https://doi.org/10.1162/jocn.1995.7.2.153>>.

that exists does inform us of his ability to organise themes systematically. What can be seen on paper does not suggest any sonata-like quality, but it is obvious that the two main themes were recognised as such, and each was allocated its own section with similar materials strung together

NM4's Haydn is an excellent example of strophic form, with the P-theme reigning supreme as the central axis around which the answer revolves. The downfall of this answer seems to lie in the candidate's limited ability to process continuation materials that serve as inter-thematic bridges: this explains the pile-up of TR, dominant-based Adagio sequence, and ultimately, the ReTR at the end of the answer.

Similarly, NM6 displays the ability to group themes systematically, although the execution is less tight-knit than that found in NM4's own: her chains are very short, and mostly consist of initiation-cadential pair, without much continuation in the middle. This naturally results in a pile-up of continuation materials at the end.

The circumstance surrounding NM18's answer is comparable to NM6, except that NM18 also displays the inclination to over-cadence, i.e. using multiple PACs one after another. This over-zealous cadential application, combined with short-chaining themes, naturally result in another case of pile-up material at the end.

In conclusion, then, the misappropriation of ReTR at the end of each reconstruction seems to be related to two aspects: 1) short-chaining; and 2) over-zealous cadential processing and application. Balance, then, seems to hold the key to successful functional interpretation. As we shall see in the next sub-section on strophic form, this indeed is crucial to ensure a logical strophic sequence.

6.1.3.2 MC

The placement of an MC clip at the end of a piece of reconstruction can be found in S12's Mozart with its bifocal close non-closure, as well as NM 14's Beethoven and Haydn, with the false MC and V: HC MC respectively.

In the case of S12, the answer starts out rather accurately, with clear signs of someone who could have been aware of the original piece itself (although he was not actually familiar with the sonata in question). The first half displays the understanding of the bi-thematic nature of the original piece that had been dissected – both the P- and S-themes were correctly identified and categorised into separate groups. Although the implied sonata design becomes blurrier the further we go into the answer, it remains clear that S12 recognised the main themes available and was able to organise them systematically. The confidence score, however, plummets rapidly when it comes to the final five clips on the answer sheet: sequential thirds, postcadential, reprise of the developmental theme, an OMT gesture and the bifocal close. Up to this point, S12 had maintained a fairly consistent level of confidence, marking his answers between 3 and 5 bar two instances of 1. The final five clips, however, were consistently rated 1. Scrutinising these clips, we gather that there are two cadential and three continuation types, notwithstanding the fact that the developmental reprise is more akin to an initiation than a development.²⁶²

S12 was successful with one OMT iteration. The first developmental phrase was chained correctly with the retransition, which suggests a failure to recognise repetition and categorise thematically the second time round. The pattern of sequential thirds was never recognised as a postcadential gesture – the first placement in the first half of the answer saw it being misread as a continuation, and this misinterpretation is consistent with the placement of the second pattern of sequential thirds, i.e. after the continuation to S-theme. It must be noted

²⁶² To read this developmental theme as an initiation would constitute a misinterpretation.

that in both cases, the candidate's confidence level was marked as 1, which indicates that the misreading was likely due to confusion, and not a conscious mistake, i.e. it is probable to assume that S12 does not genuinely and generally process these functions as he had in this context.

In his methodology, he stated that he 'tried to listen to the beginning and ends of each clip and match the two.'²⁶³ This methodology is not particularly detailed, and does not hint at any formal awareness or systematic working. Had this been the case with an NM participant, the result would have likely been much less structured, with absolutely no sonata form trends observed. With S12, it is likely that his regular, higher exposure to Classical parameters in an academic setting offset this arbitrary-sounding approach.

On the other hand, the last appearance of the postcadential was the only misreading out of the possible two. The same can also be said of the reprise to the developmental theme. Looking at these five 'leftover' clips, then, we can see that functional understanding and syntactical perception are not necessarily consistent, be it in the listening process, or during the reconstruction effort. A factor that also supports this observation is the seemingly not-so-solid grasp of form as explained above.

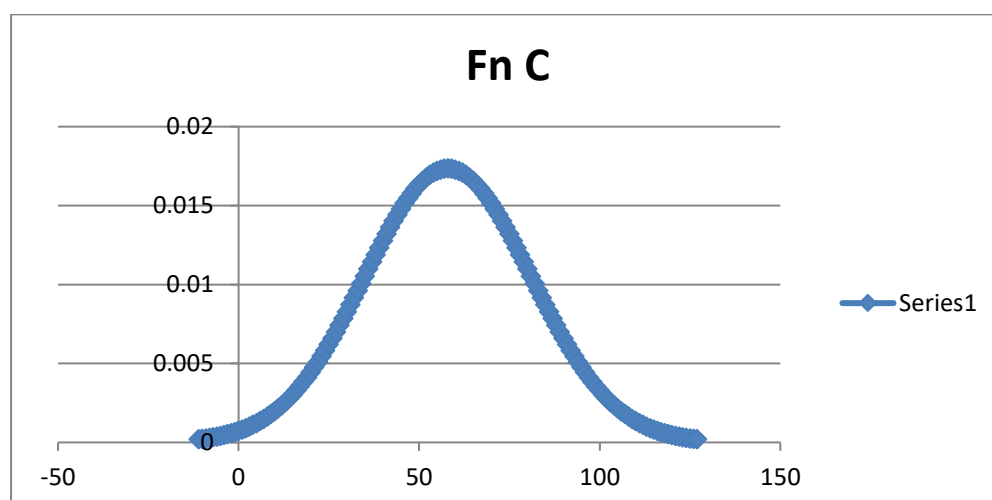
NM14 plumped for expectant MC's to end both his Beethoven and Haydn: false MC in the former, and the V: HC MC in the latter. His strategy consisted of 'listen[ing] to the start of each musical box'²⁶⁴ – again, a very ambiguous approach that risks bringing arbitrary results. Hints of strophic form can be easily observed in both answers, although NM14's performance in the Beethoven is much better, showing a consistent ability to organise syntax systematically in the initiation – continuation – cadential order. This order is not present most of the time in the Haydn, where the overall impression is that of a rather erratic guesswork: despite the (mostly) regularly spaced placements of the opening theme – indicating awareness

²⁶³S12, 'Methodology', November 2019.

²⁶⁴NM 14, 'Methodology', February 2020.

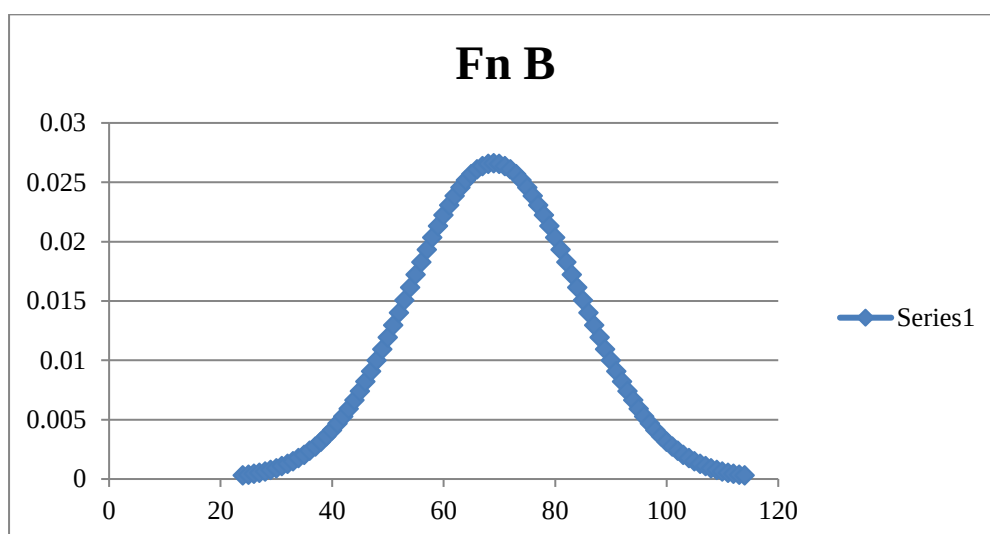
of the status of the melody – chains can start with either initiation or continuation. NM14 scored 45% in terms of functional awareness in the Haydn; the normal distribution curve below (derived from mean and standard deviation values) shows the distribution of Haydn functional score for the NM demographic, and 45% is in the lower half of the distribution. This score is therefore consistent with the overall impression noted above. NM14's choice of ending the Haydn with an MC is therefore not largely representative of the NM cohort's functional understanding in this puzzle.

Figure 25 Normal distribution: functional score H for NM



On the other hand, his functional score for the Beethoven is in the upper half of the distribution at 83.9%. That NM14's Beethoven ends with an expectant pause is inconsistent with his generally remarkable functional performance, which leads me to argue that the MC placement was likely borne out of guesswork, just as he had done at the end of the Haydn.

Figure 26 Normal distribution: functional score for NM



The considerably marked difference between the two functional scores can perhaps be attributed to the melodic content of each piece. As part of the discussion surrounding the use of initiation function to end a reconstruction, I contended that Haydn's melodic construction, coupled with his shorter sonata duration, posed a higher risk of misinterpretation compared to Beethoven, despite the latter's various innovative treatments of the Classical syntax. NM14's ability to organise a great majority of his Beethoven into initiation – continuation – cadential sequences was likely to have been aided by the plentiful selection of clips from each functional category. As I have also previously argued, the greater the selection of clips, the less chance there is of making a mistake.

That NM14 remained unable to finish his Beethoven on a genuine PAC, however, requires another explanation. The final two clips in his answer are the rondo theme and the false MC. It is unlikely that NM14 was aware of the rondo design of the piece. I mentioned that this answer is clearly strophic, but a disclaimer must be included: this is not strophic form that begins with the same material every time – it alternates between all available initiation functions. This means that despite nominating the rondo theme as the opening material – very confidently, too, as indicated by his marking it 5/5 – NM14 did not fully realise its significance: it was an initiation function, and nothing more.

A very common issue that ties all these syntactical problems together seems to be the lack of awareness relating to proportion. Balance, symmetry and contrast are the cornerstones of Classical syntax, contributing overall to a well-proportioned sonata form. It would seem that this is not a principle that comes instinctively, and the inability to bring this principle to life bears various consequences, ranging from mild to extreme, such as ending on an expectant phrase.

6.1.3.3 Development

The third and final type of non-cadential cadential point is the misappropriation of developmental sequence, which can be found in NM9 and NM15's Haydn answers: the former put the second sequence, whilst the latter the first sequence. Design-wise, both answers show clear indications of strophic form, but neither fully realises the status of the P-theme. NM15 fared slightly better by recognising the similarity between the P-theme and its derivation in the development – the two clips are put at the very beginning of the answer. On the other hand, NM9 seems to have conjured two main thematic materials out of the clips available: the TR and the P-theme itself. Both are showcased in more or less equal capacity in her answer, which inevitably results in balance-related issues that also affect the potential for an overall logical flow. The inability to distinguish between continuation and initiation functions is also observed in NM15's answer, with the same result regarding balance and proportion. A further piece of evidence to support this diagnosis is the initiation-heavy tail-end of both answers, strongly indicating the overuse of continuatory materials in place of initiation for previous chains.

The conclusions derived from the findings and discussion above shed light on how these continuation-led endings happened – or at the very least, a working attempt at explaining the probable reasoning patterns behind such events. Initiation-as-cadential and continuation-as-cadential events are not necessarily caused by the inability to perceive

cadential function, but more likely result from proportion-related issues that arise as a consequence of poor thematic and formal organisational skills. Balance, symmetry, and contrast are the cornerstones of Classical sonata, and it seems that training and expertise hold the key to achieving awareness of these principles: not a single F-candidate committed such a faux pas, and only two S-candidates did so, with one submitting an answer that is incomplete to begin with. This strongly suggests the role of expertise in structuring a piece musically.

5.6 Unfinished ending

6.2 Summary of unfinished ending

Most candidates were able to end their reconstructions with a PAC, save the following individuals in the following pieces:

Table 61 Candidates with unfinished endings

	Mozart	Beethoven	Haydn
F	NA	NA	4, 5
S	12	NA	NA
NM	2, 3, 5, 8, 9	2, 4, 14	4, 5, 6, 8, 9, 10, 11, 12, 14, 15, 18 ²⁶⁵

Table 62 illustrates the data above in percentage form:

Table 62 Candidates with unfinished endings (%)

	Mozart	Beethoven	Haydn
F	NA	NA	66.7
S	6.67	NA	NA
NM	27.78	17.6	73.3

We can see from the information presented above that ending on a PAC, the most satisfactory ending that a piece of music in the Classical style can offer, is an almost instinctive tendency

²⁶⁵ Some of these 'unfinished endings' are in fact finished in the sense that they did end on PACs, but not quite the PAC that has the gravitas to conclude the piece.

displayed by the majority of participants regardless of their expertise and background. It must be noted, however, that despite this considerably high success level across all three demographics, not all PAC endings fulfil the criteria for a satisfactory final PAC as defined by Caplin.²⁶⁶ Nevertheless, the fact that most candidates could see the suitability of a PAC as an ending itself already meets the hypothesis of this project, namely that human beings could not only perceive formal function, but also recognise a specific function for the purpose it serves in a piece of music. This also supports previous findings that investigated human ability to determine satisfactory ending to a piece of music.²⁶⁷

Of course, it must be acknowledged that NM performed worse than F and S in this aspect, and that can very likely be attributed to expertise. Ending on a PAC is a basic tenet that is fed to every single student who has been through a formal music education. It is one of the most fundamental elements in the music curriculum, which naturally translates to Music students being fully aware of the need to do so at the close of their reconstructions, no matter how confounding the rest of the task was. The only formally trained candidates who did not manage to do so are S12, F's 4 and 5, and their results will be scrutinised below alongside those of the NM group.

Those who did not manage to secure PAC endings, however, could not be immediately written off as incapable of discerning the need for a satisfactory close in this musical style. There exists a plethora of explanations that could serve to shed light on this defect, one of which is that candidates simply gave up reconstructing due to the complexity of the task. Previously, I have disclosed that many candidates were discouraged and disheartened in the process of completing the three puzzles because of the lack of financial reward and direct relevance to their life. These concerns are understandable given the amount

²⁶⁶ See Caplin, 'The Classical Cadence: Conceptions and Misconceptions'.

²⁶⁷ See, for example, David R. W. Sears, 'The Perception of Cadential Closure', in *What Is a Cadence? Theoretical and Analytical Perspectives on Cadences in the Classical Repertoire*, ed. by M. Neuwirth and Pieter Bergé (Leuven: Leuven University Press, 2015), pp. 251–83.

of time, effort and concentration required to see these tasks through. Bearing these in mind, it is entirely plausible to conclude that unfinished endings are simply manifestations of candidates whose efforts deteriorated as they progressed, ultimately unable or unwilling to finish the piece properly.

Not all PACs are eligible to be considered as satisfactory ending PACs, i.e. the PAC to finish the piece of music satisfactorily. This will be discussed in greater detail in the latter part of this chapter, where we will look into the individual functional misunderstandings that crop up in this experiment. In the meantime, these faux endings will simply be acknowledged below.

Finally, the highest proportion of unfinished ending is found in the Haydn reconstructions by NM. The previous section on functional awareness confirmed that the degree of syntactical complexity increases in the Mozart → Beethoven → Haydn order. Based on this finding, it is thus reasonable to offer complexity as a possible reason for the considerably higher percentage of unfinished ending in Haydn by NM: with no theoretical background and formal exposure to the stylistic tenets of Classical syntax, being unable to decipher Haydn's unorthodox idiom is perhaps only to be expected.

6.2.1 Discussion of unfinished ending cases

Below are discussions of three reconstructions that do not end on eligible PACs; most unfinished endings are NM products, whose explanations have been tabulated for clarity and can be seen in its entirety in Appendix 11:²⁶⁸

- F's 4 and 5 (Haydn): These candidates ended on a weak PAC, i.e. the cadential function that completes the very first iteration of P-theme. This cadence, albeit

²⁶⁸ An eligible PAC to conclude an entire piece of music can be one of the following four options: EEC; ESC; the true final phrase itself; or a cadential function from a thematic statement that has been carried out in full, i.e. with complete pre-cadential steps and a clear V-I progression, not merely prolongational. The latter explains why the PAC that concludes the statement of Haydn's P-theme is considered as weak and therefore not suitable to be assigned the status of final cadence.

showing a V-I progression, is an extension of the dominant prolongation that in turn prolongs the initial tonic, therefore it is not a solid enough PAC candidate. F's 4 and 5 constructed their Haydn answers in very similar manners, showing evidence of using thematic similarity as the main strategy. This results in pieces organised into melodic chunks, most of which are based on both the P- and S/MC-themes, with development sections mostly grouped together. Both managed to end their Mozart and Beethoven reconstructions perfectly, correctly identifying the PACs found in the original versions themselves, which suggests that they do not lack the expertise to parse and process such cadences.

- S12 (Mozart): This candidate ended on a I: HC MC, i.e. the bifocal MC that ends the TR clip in the piece. His functional performance on the whole was commendable at 71.9%.

There is no sonata structure present, however, nor was it indicated in S12's answer; the answer is instead very suggestive of a strophic form that is largely structured as follows: P-S-P-S-remaining material such as Dev, TR, etc. 'Tried to listen to the beginning and ends of each clip and match the two' – this was the strategy used by the participant to reconstruct the puzzles. From this, we could deduce that there was very little, if any, theory-based approach and it is entirely possible that the candidate simply collected 'wayward' clips of whose locations he was unsure, and placed them at the end. Considering that S12's Beethoven and Haydn reconstructions were not left unfinished – and if we also consider that findings have suggested that Beethoven and Haydn are syntactically harder than Mozart – it is not that S12 lacks the ability to parse and process the Mozart puzzle.²⁶⁹

²⁶⁹ As discussed in a follow-up email with S12.

6.3 Weak PAC ending

Among those who exhibited unfinished endings in their answers, a few stood out by virtue of having weak PACs as their conclusion – not quite the affirmative closure by theoretical standards, but at the very least, they do not leave the music hanging. The five case studies below are all solutions to the Haydn puzzle.

- F4

A good thematic organisation can be seen in this answer, which is centred around the P-theme, with the fourth strophe functioning as a contrasting middle. F4 wrote that he used a two-pronged method to solve the three puzzles: listen and categorise. At every initial listening, he would attempt to figure out the overall genre.²⁷⁰ This systematic approach manifests itself in the answer in question here with its orderly organisation. The overall design is nevertheless strophic – not tripartite, and certainly not remotely close to sonata form – with the following configuration:

Table 63 F4 Haydn reconstruction, strophic configuration

Strophe	Sequence	Beginning		Middle	End
1	8/2/3/4	P-statement		Dominant lock	P-PAC, ESC
2	5/1/7/6/10	P-statement		Adagio, MC	P-PAC, EEC
3	11/12/13/14	P-statement		Dev x2	Close of Expo
4	15/16	Dev TR		Dev TR	Close of Recap
		Pre-	Beginning	Middle	End
5	21/18/17/19/20/9	ReTR, TR	P-statement	Dev P	P-PAC

This configuration displays elements from the strophic combinations marked 'likely' in the previous table. Three of the five chains comprise four or five clips, and each chain shows a logical functional progression, from initiation to cadential. The presence of two double-PAC events, meanwhile, is actually a common occurrence in all samples collected regardless of background and expertise, and will be discussed further later in this sub-section.

²⁷⁰F4, 'Methodology', April 2020.

- F5

Table 64 F5 Haydn reconstruction, strophic configuration

Strophe	Sequence	Pre-	Beginning	Middle	End
1	1/5/2/6/10/3	Adagio	P-statement	Dom lock and MC	P-PAC, EEC, P-PAC
2	7/16/4		MC		Close of Recap, ESC
3	17/11/8/20/21/18/19/1 5/13/14	MC	P-statement x2	Dev x2, TR, P-statement, Dev x2	Close of Expo
4	12/9		Dev		P-PAC

This four-strophe answer is unique for incorporating both ends of the size spectrum: the third strophe is extremely long, whilst the final one is very short – both have been labelled as rather unlikely scenarios.

In the third strophe, there are two points worth noting, the first of which is the placement of MC as pre-initiation. This is, of course, my interpretation of the candidate's reconstruction, but as I have explained in my analysis of Haydn's piece in Chapter 2, this MC behaves in a very ambiguous manner indeed. Located at the tail of the dominant lock, and by virtue of very clearly being a strident dominant figure, it is the only convincing candidate given by Haydn for an MC. At the same time, there is no thematic model that ensues from this dominant fanfare, which retrospectively coaxes listeners and analysts alike to consider it as having a double identity: MC and S-theme, all meshed in one. Moreover, having the possibility of being interpreted as S-theme also means that this figure carries a substantial cadential burden: found at the end of S-theme, as is usually found in conventional Classical sonatas, is the structural cadence – the EEC and ESC in the exposition and recapitulation respectively.

The fluidity with which we can experience this material is reflected in the answer above: F5 has used MC as a pre-initiation (like an MC that ushers in S-theme); a beginning (like S-theme itself); as a middle (a nod to the fluctuating nature

that comes with being the conclusion of TR, as well as its open-ended personality that enables multiple interpretations); and as endings, thanks to the presence of the EEC and ESC at the end of the second iteration of each MC/S.

A further interesting point concerns the subsuming of initiation within continuation phrase. We can see that middle section features an initiation function, i.e. the statement of P-theme, amongst developmental and TR phrases. This is an example of ambiguous chaining that is not unique to this answer.²⁷¹ As has been explained in the previous sub-section, this incredibly lengthy chain can be explained in two ways: a pure case of misunderstanding; or an attempt at an OMT-style configuration reminiscent of Schmalfeldt's own cadential procedure.

- NM8

Table 65 NM8 Haydn reconstruction, strophic configuration

Strophe	Sequence	Pre-	Beginning	Middle	End
1	8/15/20/5/17/2/21/16/10		P-statement	Dev x2, P-statement, TR x2, ReTR	Close of Recap, EEC
2	18/9			TR	P-PAC
3	11/14		P-statement		Close of Expo
4	13/3			Dev	P-PAC
5	7/19/12/1/4/6	MC	P-statement	Dev, Adagio	ESC, P-PAC

Another answer that features both ends of the length spectrum, starting with an extended chain that could have been separated into two, as per my explanation of F5's own giant construction.

A notable feature that can be gleaned from the tabulation above is the clear alternating pattern of thematic organisation: it is based on P-theme, with TR and developmental materials interjecting, ultimately resulting in a rather classic trope in popular song, albeit slightly extended: verse/chorus – bridge – verse/chorus – bridge – verse/chorus.

²⁷¹ Refer to sub-sections on commonly misinterpreted formal functions and formal awareness.

- NM10

Table 66 NM10 Haydn reconstruction, strophic configuration

Strophe	Sequence	Pre-	Beginning	Middle	End
1	19/2/10		P-statement	Dom lock	EEC
2	7/18/14		MC	TR	P-PAC
3	21/4/3/9	ReTR			ESC, P-PAC x2
4	11/12/13/8/15/16		P-statement	Dev x2, P- statement, Dev	Close of Recap
5	20/1/17/5/6		Dev-P	Dev-P, Adagio, TR, P-statement	P-PAC

The third strophe deserves particular mention for its unique configuration that is not captured in the tabulation system: following the ESC, the first weak PAC that serves as the response to the statement of P-theme in actuality comprises not only a cadential function, but also a continuation. This means that there is an OMT-like backing-up procedure following the ESC, even though the ESC itself is already a complete ending on its own. The third strophe, then, can be divided into two unequal parts.

A further example of such functional embedding can also be found in the final strophe, where a statement of P-theme makes an appearance after the three continuatory phrases. This dovetails naturally with the final PAC given by NM10.

We also see the unique nature of the MC and the P-based developmental section being played out in the second and fifth strophes respectively: they are open-ended constructions that combine traits from initiation and continuation functions – this property is manifest in the way NM 10 has deployed them.

- NM 11

Table 67 NM11 Haydn reconstruction, strophic configuration

Strophe	Sequence	Pre-	Beginning	Middle	End
1	11/17/18/4		P-statement	TR x2	ESC
2	5/6/		P-statement		P-PAC
3	7/20/3/10	MC	Dev-P	Dev-P	P-PAC, EEC

4	2/14			Dom lock	Close of Expo
5	13/21/15/1/19/12/8/16/9			Dev x3, Adagio, P-statement, Dev, P-statement	Close of Recap, P-PAC

Although this answer is based around the P-theme, it is not as obvious as the three we have discussed previously thanks to the subsuming of half of it among continuation rhetoric in the last strophe. If we were to take them into consideration, there will emerge – very roughly – a kind of mirror image between the first and the final two strophes, with the third being the central axis. Although not definite by any means, it satisfies the context of the experiment, resulting in a complete piece that exhibits signs of formal demarcations.

The P-based development serves both beginning and middle functions in this reconstruction due to its properties: the start of this phrase – and indeed, that of its TR-based counterpart – closely resembles initiation function, before the music makes a foray into continuation territory.

- NM12

Table 68 NM12 Haydn reconstruction, strophic configuration

Strophe	Sequence	Pre-	Beginning	Middle	End
1	8/5/2/6		P-statement x2	Dom lock	P-PAC
2	19/11/7/4		P-statement x2	MC	ESC
3	15/21/14			Dev x2	Close of Expo
4	12/13/20/17/3/10			Dev x2, TR	P-PAC, EEC
5	18/1/16/9			TR, Adagio	Close of Recap, P-PAC

So far, we have seen that formal clarity is a running theme across the four Haydn answers that exhibit closure. Out of the five Haydn answers with PAC-endings, however, that of NM12 is the least structured.

The last three strophes lack initiation phrases as the latter have all been used up by the time the second strophe came around. Although the two-fold statements may seem unusual, it is perhaps not so unsurprising given that each statement ends on an expectant dominant pause, which could either conclude on a PAC or induce a reprise. This does, however, mean that NM12's reconstruction is not so much strophic as bipartite. The term 'bipartite' here is by no means used with reference to standard two-part forms found in Classical music, such as binary form – I simply wish to express the fact that the reconstruction at hand can be divided into two in a 2:3 manner, thanks to its functional configuration.

The five answers cited and discussed above are the most successful samples out of a pool of incomplete reconstructions submitted. They are not quite perfect due to the use of the weak PAC as closure – they fall in the middle of the spectrum of satisfactory closure in the Classical context. Such answers tell us two things, the first of which is the importance of thematic organisation in ensuring logical musical presentation. Secondly, it is that the importance of musical organisation is even more pronounced in the case of Haydn sonata for those without the theoretical know-how. Precisely because Haydn's sonata is very fragmentary, thematic organisation is a genuine challenge in this puzzle setting. From the table above, we can see how every candidate – bar F's 4 and 5, as well as NMs 8, 11 and 12 – suffer from a lack of organisation in their answers, a lapse which ultimately results in truncated endings. This suggests that one of the keys to achieving a satisfactory reconstruction is logical thematic planning. By 'satisfactory reconstruction,' I do not at all

mean an accurate representation of the original version – in the context of this experiment, 'satisfactory' merely refers to the presence of logical and systematic presentation, all of which are strongly implied in the three NM answers named above.

6.3.1 Summary of PAC understanding

With a view to corroborate the argument above, I present a table summarising every ending submitted by every participant in this study. Table 69 shows cadential perception trends – specifically the ability to discern and select an appropriate PAC to conclude an entire piece of music – found in Mozart, Beethoven and Haydn in the context of intra-thematically segmented musical puzzle reconstruction.²⁷²

Table 69 Quality of ending in MBH

Participant	Mozart	Beethoven	Haydn
F1	+	+	NA
F2	+	+	
F3	+	+	
F4	+	+	Weak PAC *
F5	+	+	Weak PAC *
F6	+	+	End of exposition
S1	+	+	NA
S2	+	+	+
S3	+	NA	
S4	+	+	+

²⁷² + denotes satisfactory ending using one of the options listed under footnote 44 on page 43; NA denotes no submission. * denotes satisfactory thematic organisation, whilst ~ represents a lack of such organisation.

S5 ²⁷³	Incomplete but +	Incomplete but +	NA
S6	+	+	
S7	Incomplete answer	NA	
S8	+		
S9	+	+	ESC
S10	+	+	+
S11	+	+	+
S12	HC MC	Coda 3	End of exposition
S13	+	+	End of exposition
S14	+	+	+
S15	+	Coda 3	ESC
NM1	P PAC		NA
NM2	Sequential thirds	Postcadential	
NM3	CBI	Coda 1	End of exposition
NM4	+	Postcadential	ReTR
NM5	+ with postcadential from ESC	Coda 1	P
NM6	+	+	ReTR
NM7	+	+	End of exposition
NM8	Sequential thirds	+	Weak PAC *
NM9	CBI	+	Dev. seq. 2
NM10	+ with postcadential from ESC	ESC	Weak PAC
NM11	ESC	Coda 2	Weak PAC *
NM12	+	+	Weak PAC *
NM13	+	+	NA
NM14	+	False MC	MC
NM15	+	+	Dev. seq. 1
NM16	+	+	+
NM17	+	+	+
NM18	+	Coda 2	ReTR

The presence of multiple PACs in what is clearly a single cadential function is a common phenomenon in this reconstruction study, with candidates from all walks of expertise exhibiting this tendency. It seems that cadential strength, or more particularly, the strength hierarchy of PAC, is not something that is perceptible. This difference is in fact crucial if we were to avoid 'problematic analyses of cadence, which, in turn, can lead to problematic interpretations of phrase structure and form.' As Caplin has pointed out, although 'we can speak of cadential function possessing a cadential *content* (consisting of conventionalised harmonic, melodic, and rhythmic gestures), we must be careful not to assume that the presence of cadential content necessarily signals cadential *function*.'²⁷⁴

²⁷³ This candidate leaves the middle of her answers empty, but nonetheless placed the correct PACs at the very end.

²⁷⁴ Caplin, 'The Classical Cadence: Conceptions and Misconceptions', *Journal of the American Musicological Society*, 57.1 (2004), 51–118, 82, original italics.

Considering that PAC gravitas is closely linked to its place in the overall form, a firm grasp and confident application of sonata principles is likely to be required in order to determine a suitable PAC selection for a particular spot.

Table 70 Ending on Initiation and ending on Continuation

Ending on continuation				Ending on initiation			
	M	B	H		M	B	H
NM		1	6		2		1
S	2						
F							
Total	5.40%	2.94%	22.20%		5.40%		3.70%

Chapter 7: Cadential function and form

7.1 Unfinished ending and strophic form

Seeing as the majority of non-cadential endings are caused by balance-related issues, this sub-section is going to discuss in greater depth the relationship between ending and form. A table summarising the unfinished ending cases can be found below:

Table 71 Cases of unfinished ending

	Mozart	Beethoven	Haydn	Suspected reason
<i>F4</i>			<i>Weak PAC</i>	<i>Melodic chunks with good thematic organisation</i>
<i>F5</i>			<i>Weak PAC</i>	<i>Melodic chunks with good thematic organisation</i>
S 12	HC MC			Strophic writing and leftovers
NM 2	Sequential thirds	Postcadential		Strophic writing and leftovers
NM 3	CBI			Thematic grouping worsened and leftovers
NM 4		Postcadential	ReTR	Very low sequential accuracy
NM 5	Postcadential		Statement P	Disorganised and leftovers
NM 6			ReTR	
<i>NM 8</i>	<i>Sequential thirds</i>		<i>Weak PAC</i>	<i>No form detected but good thematic organisation</i>
NM 9	CBI		Development sequence 2	Disorganised
<i>NM 10</i>			<i>Weak PAC (double-PAC)</i>	<i>Loosely strophic with good thematic organisation</i>
<i>NM 11</i>				<i>Strophic with good thematic organisation</i>
<i>NM 12</i>				<i>A tripartite form is implied with good thematic organisation</i>
NM 14		False MC	MC	No thematic grouping
NM 15			Development sequence 1	Thematic grouping suffered and leftovers
NM 18			ReTR	

Unfinished endings aside, insight into cadential understanding and processing may also be gleaned from analysing all the endings gathered in this experiment from all groups. It is not the case that reconstructions with a proper PAC conclusion warrants no further scrutiny.

Take, for example, the unfinished Mozart by NM11. The type of closure used by NM11 in

his Mozart reconstruction is the ESC, which, whilst not technically the ending Mozart uses himself, is functionally and grammatically correct according to Sonata Theory – moreover, the ensuing music, i.e. post-ESC, in the original version is fully tonic prolongational, with no additional attempt at a genuine PAC. This makes NM11's answer a compelling one despite not being 'finished' in the sense of matching Mozart's manuscript note-for-note.

In the next sub-section, we will see how this type of in-between answer, especially when taken in consideration alongside the underlying strategy, expertise, confidence and formal awareness, can also tell us the following points:

- The audibility of the PAC hierarchy;
- The extent to which expertise and strategy (being systematic and logical in approaching the clips²⁷⁵) determines the audibility of said hierarchy.

7.2 Relationship between compositional style and cadential processing

Expertise and the ability to group similar themes in an organised fashion, as well as having schematic expectations borne out of continued exposure,²⁷⁶ however, are not the only determining factors in cadential processing – compositional style, too, seems to hold at least part of the key to uncovering more details on this cognitive phenomenon. The summary of unfinished endings above shows several traits that appear to define this trend of non-closure:

- Firstly, the majority of truncated endings that surfaced in this experiment originate in the Haydn sonata – 11 out of 27 are Haydn cases, i.e. as much as 40.7% of the total sample;

²⁷⁵ More of this will be discussed in section 3.3.10.

²⁷⁶ Andy Clark, for example, has dubbed the brain as a 'statistical sponge' that collects and collates information to predict the future. See Andy Clark, 'Whatever next? Predictive Brains, Situated Agents, and the Future of Cognitive Science', *Behavioral and Brain Sciences*, 36.3 (2013), 1–73. See also the definition of schemata as a unitary mass in F. C. Bartlett, *Remembering: A Study in Experimental and Social Psychology* (London: Cambridge University Press, 1932).

- Secondly, only NM participants have been caught out in this regard – Haydn answers from F and S groups featured eligible PACs, or at the very least, weak PACs as shown in F's 4 and F 5's answers;
- Thirdly, there seems to be a correlation between low sequential accuracy and such incomplete conclusion.

I am proposing that Haydn-esque syntactical strategies are so elusive that failure to organise themes systematically is likely to result in a truncated construction, as opposed to Mozartean and Beethovenian syntaxes. In Chapter 1, I hypothesised that Beethoven's 'new path' would be more easily understood than Haydn, despite the former's radical changes to Classical language; the reason for this is that Beethoven still follows in Mozartean footsteps – the 'new path' modifies the conventions, and the conventions are largely Mozartean – and as our curriculum was largely drawn up according to the Mozartean language, comprehending these two styles is less of a complication. This set of cadential processing data seems to support this hypothesis, although a disclaimer does need to be included: cadential perception in Mozart and Beethoven is less of a challenging issue for non-musicians than in Haydn – the latter seems to be the most confounding for individuals with no formal training in music theory.

7.3 The role of good structural and thematic organisation

The five candidates who selected the response to P-theme in the Haydn as their ending, i.e. the weak PAC, have one thing in common: their answers may not be a faithful representation of the tripartite form implied, but thematically speaking, each of these reconstructions is very well-organised. Solid thematic organisation, then, seems to play a certain role in determining the accuracy of the ultimate destination that is the ending. From the table above, we can see how each non-weak PAC unfinished ending stems from a lack of organisation.

Organisational imprecision in puzzle reconstruction seems to contribute to a pile-up of 'leftover' clips. This oversight, however, does not always mean reconstructions in complete disarray – two of the candidates listed in the table above show strophic (or verse-chorus-like) tendencies in their answers. Strophic form, of course, is a well-known device used in many genres, most notably these days in popular music.²⁷⁷ Given that most participants listen to popular repertoire on a regular basis, it is no surprise that they are well-accustomed to the repetitive form, or at the very least, can recognise such a design subconsciously. Strophic music, by its very name and design, suggests an inherently thematic and structured entity. Bearing this in mind, it is reasonable to assume that strophic reconstructions, whilst not in any way related to sonata or tripartite form, are at least musically and formally secure. This, however, turned out not to be the case, as exemplified in S12 and NM2's solutions.

7.4 Using strophic form in reconstructing sonata puzzles

This reliance on strophic form is more or less a major contributing factor to the rather high rate of unfinished endings in the sample collected.²⁷⁸ Strophic form sometimes can result in a PAC ending, albeit weak; however, as we can see in NMs 6 and 18's Haydn reconstructions, the use of strophic form resulted in a pregnant end, i.e. the expectant dominant note at the end of the retransition. When using strophic form to reconstruct sonata material, it seems that the problem stems from the fact that sonata form components do not form even ratios – having six initiation functions, such as six thematic statements, do not necessarily translate to having six PACs to conclude them. In a standard strophic song, the likes of which can be seen in

²⁷⁷ For example, see John Fernando Encarnacao, 'Musical Structure as Narrative in Rock', *Portal*, 8.1 (2011) <<https://doi.org/10.5130/portal.v8i1.1956>>, 14; John Covach, 'Form in Rock Music', in *Engaging Music: Essays in Music Analysis*, ed. by Deborah Stein (Oxford: Oxford University Press, 2005), pp. 65–76, 66; Walter Everett, 'Pitch Down the Middle', in *Expression in Pop-Rock Music: Critical and Analytical Essays*, ed. by Walter Everett, 2nd edn (New York: Routledge, 2008), pp. 111–74, 112.

²⁷⁸ Considering the strong link between strophic form and cadential points, I have elected to discuss strophic construction under the 'Cadence' sub-section.

generic popular repertoire, six verses more often than not equal six choruses and six cadential endings.

Fundamentally, a strophic reconstruction of a piece in Classical style could work, provided that the engineer designing the piece ensures that every strophe is balanced in terms of the number of clips and types of formal function used. In the case of Classical piano sonatas, there are likely to be two symmetrical – and therefore numerically equal – sections, with a middle section that might be sized differently.²⁷⁹

Using strophic form in this reconstruction exercise may work, but the key seems to lie in being able to delay cadential points, considering that we have to factor in transitory clips: bearing in mind the sonata narrative, there will likely be more transitory or continuation-like clips than there will be cadential points. The calculations below will attempt to show the importance of balancing strophes; to aid the following probabilistic calculation, I will use the Mozart sonata (i.e. Puzzle 1) as example. In this sonata, the two outer sections are of equal length, whilst the development is 60% smaller.

Total clips: 33 (16 expositions, 3 developments, 16 recapitulations)

Themes: P- and S-themes

Number of thematic iteration (initiation function): P-theme x4, S-theme x4, S-theme post-tonic confirmation x2, Development x2

PAC: P-theme x4, S-theme x2 (EEC and ESC), sectional ending x2 (The sectional ending category consists of the prolongational gesture found in the final bars. Whilst these are not technically PACs, they are inherently the rightful conclusions to the exposition and recapitulation in the sonata, and will therefore be included.)

²⁷⁹ A strophic chain, or a melodic chain, is demarcated by cadential points. In most cases, they are distinguished from each other by the presence of an initiation function and a PAC at each end.

Given the above sonata design, here are the most ideal strophic forms, showing the number of clips per strophe and the implication of such numbers:

Table 72 A model for an ideal strophic form

Number of strophe	Number of clips per strophe	Probability for successful strophic form
2	16	Too long
3	11	Too long
4	8 and 1x9	Possible but less likely
5	6 and 3x7	Possible but less likely
6	5 and 3x6	Likely
7	4 and 5x5	Likely
8	4 and 1x5	Likely
9	3 and 6x4	Less likely
10	3 and 3x4	Less likely
11	3	Unlikely

Of course, there exists other combinations, such as ones that feature elements from two or more strophic constructions. The above are merely basic options that illustrate the range of likelihood that any one form could be successfully executed using sonata form materials.

'Outcome' in the table heading refers to the likelihood of creating a logical sequence using the length specified in the leftmost column. The 'likely' selections of chain-length are applicable, and indeed, evident in both the Mozart and Beethoven answers collected; on the other hand, adjustments have to be made for the Haydn sonata, as it is much shorter in duration: 'likely' options in this case that guarantee PAC endings seem to hover between four and five strophes – this can be seen in the discussion below regarding successful, complete Haydn samples from the three demographics.

7.5 Very long and very short chains

Among the 37 sets of submitted answers, there have in fact been very long melodic chains that more or less contain more than eight clips; there are no chunks containing eleven or sixteen clips as suggested above – they are merely for illustration purposes based on the numbers provided in the case study. Such lengthy chunks are never melodically nor harmonically nor formally satisfactory: they meander without direction, which renders them rather illogical. In contrast, brief, two-clips' worth chunks are also common; in the third puzzle, there are also numerous instances where candidates plumped for one-clip entities in the form of the MC iteration. These can be effective – initiation and cadential, for example, whose success nevertheless depends on the holistic state of the initiation (of which the Haydn MC is a passable example inasmuch as it exhibits initiation, continuation and cadential functions all condensed into a pithy statement) – but can also land on the opposite end of the spectrum of accuracy should the chosen clips do not make a good combination, such as in the case of double PACs, or double continuation, and so on.

A possible counter-argument is as follows: surely it is possible to have twelve strophes considering that we have twelve initiation phrases available in the selection pot? Hypothetically speaking, the answer is affirmative. There is, however, a caveat: there are only eight cadential points from which we can choose. There are more openings than there are endings, which means that we are back to the conundrum outlined earlier: initiation and cadential functions in sonata form are not built to fit the 1:1 ratio that is commonly found in the popular genre. In this scenario, one cannot design strophes based on the number of initiation phrases (or main melodies) alone, as this tactic will only yield an unfinished piece with plenty of 'leftover' materials at the end.²⁸⁰

²⁸⁰ That said, an exception must be made for cases of extended chains that are in fact comprised of accurate sequencing of clips – I have not marked such chains as wrong.

An eight-clip chain does exist, and in fact proves to be a rather popular option, especially among NM-candidates. It seems that the less expertise one has, the greater the tendency to string a longer chain. I argued above that the logical implication of a longer chain is not promising, simply because it will be harder to ensure coherence at length. To the theoretically uninitiated, however, it is understandably – and evidently – tempting to lump similar-sounding clips together, resulting in longer chains. Admittedly, long chains with no cadential breaks in the middle are not unheard of in actual compositions in the repertoire: the second half of the exposition of K. 283, for example – the TR onwards – contains eleven clips, inclusive of the three post-EEC fragments. This works because of a balanced combination between statements and repetitions, continuation and cadential points. The ability to compile a proportional group of functions is not an intuitive skill, but one that comes with exposure and perhaps training: the experts recruited in this study have performed the best in this category, scoring the lowest in terms of illogical functional use, unfinished ending, leftovers and pile-ups, all of which are inevitable consequences from haphazard construction of lengthy chains.

Table 73 Chain length MBH in all groups (%)

Percentage values for chain length											
	Mozart				Beethoven				Haydn		
	NM	S	F		NM	S	F		NM	S	F
<i>TL</i>	13.46	12.96			17.53	9.52	23.33		2.25	8.11	7.14
<i>TS</i>	12.5	12.96	19.23		14.43	19.05	26.67		38.2	13.51	21.43
3	13.46	12.96			15.46	15.87	3.33		20.22	29.73	21.43
4	23.08	22.22	19.23		14.43	6.35	10		12.36	10.81	21.43
5	12.5	1.85	19.23		8.25	17.46	20		8.99	10.81	7.14
6	5.77	9.26	15.38		13.4	6.35			8.99	2.7	14.29
7	6.73	3.7	3.85		7.22	12.7	13.33		2.25	2.7	7.14
8	10.58	7.41	3.85		5.15	9.52	3.33		2.25	8.11	
<i>G</i>	1.92	16.67	19.23		4.12	3.17			4.49	13.51	

For the most part, Table 73 shows a clear data trend:

- The extreme ends of the spectrum, i.e. 'too long' (TL) and 'too short' (TS) are the most favoured lengths in all cases in this experimental study. As per the predictions

mentioned previously, TL and TS generally make little sense. The table below illustrates the proportion of logical TL and TS in each puzzle and each group:

Table 74 'Too long' and 'too short' chains in MBH

	Mozart			Beethoven			Haydn			Total
	NM	S	F	NM	S	F	NM	S	F	
L TL	3	0	0	2	0	0	3	2	0	10
L TS	10	7	9	3	8	2	2	2	2	45
IL TL	11	17	2	4	6	3	3	5	1	52
IL TS	11	7	26	4	4	6	0	4	1	64
Total/group	35	31	37	13	18	11	8	13	4	
Total TL/group	14	17	2	6	6	3	6	7	1	62
Total TS/group	21	14	35	7	12	8	2	6	3	108
TL/composer	33			15			14			
TS/composer	70			27			15			

Table 75 Logical and illogical TL and TS chains by type (%)

Percentage value: occurrence of logical and illogical TL and TS chains, by mistake type									
	Mozart			Beethoven			Haydn		
	NM	S	F	NM	S	F	NM	S	F
L TL	30			20			30	20	
L TS	22.2	15.6	20	6.67	17.8	4.44	4.44	4.44	4.44
IL TL	21.2	30.8	5.77	7.69	11.5	5.77	5.77	9.62	1.92
IL TS	17.2	10.9	42.2	6.25	6.25	9.38		6.25	1.56

Table 76 Logical and illogical TL and TS chains by group (%)

Percentage value: occurrence of logical and illogical TL and TS chain, by demography									
	Mozart			Beethoven			Haydn		
	NM	S	F	NM	S	F	NM	S	F
L TL	8.57			15.4			37.5	15.4	
L TS	28.6	23.3	23.1	23.1	44.4	18.2	25	15.4	50
IL TL	31.4	53.3	7.69	30.8	33.3	27.3	37.5	38.5	25
IL TS	31.4	23.3	69.2	30.8	22.2	54.5		30.8	25

A few trends can be observed from the three tables above:

1. Very few managed to create logical TL chains, and there is a higher tendency (by 42.6%) to create TS chains.

2. The tendency to create TL and TS chains decrease significantly in Beethoven and Haydn: TL by 45% from Mozart to Beethoven and Haydn; TS by 38.6% from Mozart to Beethoven, and 55.6% from Beethoven to Haydn. I would argue that the more difficult the syntax, the more challenging it would be to create chains of extreme lengths – it is much more manageable to perceive, construct and make sense of a moderately proportioned chain containing a balanced combination functions.
3. Logical TS chains are more likely to be encountered, thanks to the possibility of combining initiation and cadential functions in a successful manner.
4. There are significantly more illogical TL and TS chains, and within this category,²⁸¹ there are more TS chains that are illogical. Illogical TS chains can contain standalone clips, which explains why TS chains perform considerably better than TL on the logical front. A very common case among answers collected is the propensity to put down Haydn's MC EEC or MC ESC in between chains. As has been noted in Chapter Two, Haydn's MC EEC and MC ESC suggest multiple formal functions within one short phrase: (pre)initiation thanks to its fanfare-like opening, a brief continuatory middle and a PAC to conclude. I would argue that this hybridity was a likely contributing factor in participants' decision to place it as a standalone entity. It is also possible to combine an initiation and a cadential to make a two-clip chain. Such chains, like the statement and response of Haydn's P-theme or the statement and response of Beethoven's rondo opening, are often sequentially and functionally accurate despite being of the TS variety.

7.5.1 Calculation method

To obtain the data above, chains are decided based on cadential points – in other words, cadential points act as place-markers that determine the beginning and ending of each chain.

²⁸¹ This disclaimer distinguishes the argument from that in point 3.

The content of each chain is then scrutinised, and a chain is deemed to be logical if it largely adheres to the initiation-continuation-cadential order. Bearing in mind the large number of permutations available for each puzzle, concessions and interpretations on the part of the analyst, i.e. the writer, are inevitable: I have had to exercise my own judgement based on the knowledge in my arsenal, the criteria and assumptions on which I have based my analyses and hypotheses, and the system of multi-level perspectives that has had to be deployed flexibly throughout this chapter, depending on the type of analysis required. In the case of misinterpretation – putting a postcadential in the middle of a phrase in a manner that is reminiscent of continuation, for example – the following considerations have been taken:

1. If, like in the final chain of F4's Beethoven, a function is misinterpreted in a way that is not clear as to whether this was a genuine misreading or a case of ambiguity-led guesswork, then the chain is considered to be illogical: a sequential thirds is taken to be part of the cadential family in this piece, but it has been assigned a continuation role in this chain; however, inasmuch as there is only one such iteration, it is unclear whether the candidate truly considered this to be a continuation or whether this was guesswork, which meant that this chain is considered illogical.
2. If, on the other hand, the same single pattern of sequential thirds were to happen in an OMT series as found in F6's Mozart (sequential thirds-OMT-S cont CI'-PAC), then there is room to argue that the candidate considered the sequential thirds to be of the same nature as S cont CI', i.e. continuation – the chain is therefore considered logical. That sequential thirds is read to be continuatory is corroborated by a further implementation of the function in the second half of the answer (Clip 11).

7.5.2 The use of initiation and initiation-like clips

It is important to note that the initiation functions considered for the above calculation are inclusive of phrases that are initiation-like, as well as those that are inherently designated the status of initiation – such clips include the development strains in the Mozart, for example. I am aware that taking such clips as initiation has been considered as a form of functional misinterpretation elsewhere in this chapter; inasmuch as we are considering the starting options available to participants, however, I believe it is prudent to view the clips from their point of view, i.e. considering all possibilities, which naturally includes the chances of misreading some non-initiation clips as initiation.²⁸² In making my musical analyses and hypotheses in Chapter 2, I mentioned that certain non-initiation clips were likely to trick listeners into thinking otherwise. By way of summary, said clips are italicised below:

Table 77 Ambiguous (initiatory) non-initiation clips in MBH

	Mozart			Beethoven			Haydn		
	I	Cont	Cad	I	Cont	Cad	I	Cont	Cad
1	P stat resp	P cont	P cad	P	False MC	P cad: V	P	TR	Resp
2	S CBI	P cont rep	P cad rep	P: VII	MC	P cad: IV	P	TR	Seq
3	S CBI rep	TR	Cad OMT	P	Dev	P cad: IV	P	MC	MC 2 EEC
4	<i>S cont</i>	<i>Frag cont</i>	Post-OMT	S: III	Dev	EEC	P	Dev	Closing
5	<i>Dev</i>	ReTR	Postcad	S: iii	Dev	ESC		Dev	Resp
6	<i>Dev</i>	TR	Sequential thirds rep	S: iii	Dev	Coda		Dev	MC 2 ESC
7	P recap	<i>Frag cont</i>	End of expo	P	ReTR	Coda		Dev	Closing
8	<i>P modif</i>	<i>Frag cont</i>	P cad	P	TR	Coda		ReTR	
9	S CBI	<i>Frag cont</i>	Cad OMT	S: VI	MC	Coda		Adagio	
10	S CBI rep		Post-OMT	S: vi	False MC			MC	
11	<i>S cont</i>		Postcad	S: I					
12			Sequential thirds rep	S: I					
13			End of recap	S: I					

²⁸² The analyses carried out in this chapter alternates between various levels of perspective: at times, it is necessary to take an analytical point of view, adopting facts that are academically correct as the standard by which data is judged; at other times, such as when scrutinising misinterpretation from candidates' perspective, it is necessary to adopt their point of view in order to realise the possibilities inherent in each clip regardless of its true nature. This back-and-forth vision enables the creation of a nuanced analysis that considers both the analytical and perceptual, which is the basic premise of this study.

The plentiful availability of initiation functions in the Beethoven points to two alternatives: to use up the stock, candidates either have to create numerous chains with shorter lengths, or be able to realise the existence of thematic repetitions and group these repetitions together systematically to make logical sequences. As suggested by Table 77, the former option, i.e. chains with shorter lengths, proves to be a popular option, which explains the higher values for TS in Beethoven than in the Mozart.

In decreasing order, the availability of initiation function is as follows: Beethoven → Mozart → Haydn; the exact distribution is shown in the table below.

Table 78 Availability of formal function

Availability of function			
	Mozart	Beethoven	Haydn
Initiation	11	13	4
Continuation	9	10	10
Cadential	13	9	7

The number of functions has been calculated based on the potential of each function to be interpreted as a particular type, and not based on its actual nature. For example, the number of initiation functions in the Mozart includes the two developmental themes that appear to be initiatory. This decision was taken on the presumption that chains would generally begin and end with initiation and cadential functions respectively. Furthermore, data collected shows that candidates indeed followed this pattern most of the time – Table 79 and Table 80 show the chances of selecting initiation and cadential functions as beginning and ending respectively:

Table 79 Chains starting with I and ending with C functions

Chains that start with Initiation and end with Cadential functions									
	NM			S			F		
	Mozart	Beethoven	Haydn	Mozart	Beethoven	Haydn	Mozart	Beethoven	Haydn
BeginI	59	53	27	29	39	15	18	15	6
EndCad	102	91	80	45	62	35	26	30	14
Grand total for number of chains across all nine categories: 496									

No of chains	104	93	86	46	62	35	26	30	14

Table 80 Chains starting with I and ending with C functions (%)

Percentage values of BeginI and EndCad occurrences									
	NM			S			F		
	Mozart	Beethoven	Haydn	Mozart	Beethoven	Haydn	Mozart	Beethoven	Haydn
BeginI	56.7	57	31.4	63	62.9	42.9	69.2	50	42.9
EndCad	98.1	97.8	93	97.8	100	100	100	100	100
Occurrence of BeginI overall: 52.6									
Occurrence of EndCad overall: 97.8									

7.5.3 Summary of very long and very short chains: trends

1. In most cases, those who constructed mid-length chains (consisting of four to seven clips each) are F-candidates. As mentioned previously, these mid-length chains generally are ideal settings for logical sequencing to take place – they are neither too long nor too short, and this 'golden ratio' of sorts serves to contain the type of functions used in them, effectively lowering the chances for musical babble that often happens in TL and TS chains: TL chains tend to consist of meandering, illogical sequencing; TS chains tend to be too curt and illogical.
2. It is considerably easier for candidates to construct good (G) chains in the Mozart – the percentage values are significantly better for this puzzle than in the other two, which suggests that Mozart was the easier piece to process. This successful processing is not only in terms of functional awareness, but also in terms of generating accurate replicas of what Mozart wrote himself.
3. There are higher proportions of both TL and TS in Beethoven and Haydn, which are likely due to their comparatively unique compositional styles.
4. Level of expertise corresponds linearly to the ability to craft G chains in the Mozart and Haydn; the same cannot be said about the Beethoven.

Out of a total of 496 chains, participants managed to start chains successfully using initiation functions 52.6% of the time; meanwhile, cadential awareness per chain is nearly perfect at 97.8%. These figures support the notion that has been prevalent in the field of cognitive psychology so far, namely that local-level musical processing seems to trump global-level understanding by a significant amount.²⁸³ Take cadential processing, for example: nearly every single participant was aware of the need to end each chain with a cadential motion, even though there were a few who were not aware of the importance to do so at the very end in order to ensure a complete piece.

In the face of such a high level of local cadential awareness, the presence of unfinished endings among answers collected is therefore worth a closer look: candidates who submitted open-ended reconstructions cannot be thought of as being unable to comprehend the role of cadence and its significance, since they had consistently inserted cadential functions as place-markers throughout their answers, marking the end of one chain and the start of another. Considering that lack of cadential awareness seems to be unlikely, the fact that some answers remain unfinished therefore strongly suggests that candidates simply gave up. Another possible explanation relates to the pile-up phenomenon, whereby candidates ended up with a heap of continuation phrases, for example: such answers usually imply a lack of formal awareness, systematic planning and minimal functional understanding on top of running low on motivation.

Not a single F-candidate submitted an unfinished answer – the most severe examples are merely weak PACs filling in as the final cadential points – and the only unfinished answer from the S group comes from S12's Mozart, which concludes with a bifocal close. The major culprit for unfinished ending is the NM population, and on top of the reasons cited

²⁸³ See, for example, Tillmann, Bigand, and Madurell, 'Local versus Global Processing'; Tillmann and Bigand, 'The Relative Importance of Local and Global Structures in Music Perception', *The Journal of Aesthetics and Art Criticism*, 2004 <<http://onlinelibrary.wiley.com/doi/10.1111/j.1540-594X.2004.00153.x/full>> [accessed 29 November 2017].

previously, I would also like to add the possibility that this impairment results from the inability to balance chain content.

7.6 Mid-length chains

Let us now take a look at the mid-length chains, starting with a comparison between the eight- and six-clip lengths. An example of an eight-clip chain can be found in S4's Mozart in Table 81:

Table 81 S 4 Mozart reconstruction, second half

Clip	Sonata space	Description
8	Recapitulation	S CI
9		S continuation of CI repeated
20	Exposition	Postcadential
16		P continuation
32	Recapitulation	S CBI repeated
31	Development	Statement
1	Exposition	TR
7	Recapitulation	P cadential

I have marked this as 'possible but less likely,' with the 'less likely' being based on the low probability of combining a logical stream of clips at such a length. As we can see, there is arguably very little functional sense displayed in the chain above. There is a misreading of a continuation function from the start, followed by misinterpretations of the postcadential and the CBI. Furthermore, the bifocal caesura at the end of the transition clip is resolved not by the onset of an initiation function, but with a cadential.

Complications can also be observed in six-clip chains, which I have also marked as 'possible but less likely.' Six-clip, admittedly, is a length that is more commonly in the samples collected. For example, the second half of S4's Beethoven showcases this feature:

Table 82 S 4 Beethoven reconstruction, second half

Clip	Sonata space	Description
8	Exposition	Rondo
18	Development	Retransition
3		Development 2

13	Exposition	False MC
22		S: iii
21		P cadential

Again, there are two misunderstandings in this sequence: firstly, the retransition should have resolved to an initiation theme, not a continuatory segment; secondly, S: iii should not have been placed after the false MC. Admittedly, these are misinterpretations that are consistent with the analyses and hypotheses I provided in Chapter 2, and are effective illustrations of the trickeries Beethoven's 'new path' poses to listeners. The logical quality of this six-clip chain is arguably better than that found in S 4's Beethoven previously discussed. Although it is still considered to be rather extensive in the grand scheme of things, it is nevertheless on the more promising end of the spectrum.

Overall, such extended lengths are not as intuitive – and consequently, not as commonly found – as shorter ones, for the very simple reason that they require a variety of formal functions within a specific proportion in order to work. Even if an NM-participant had no solid strategy whatsoever and simply based his answers on 'what I think sounds right' – as a few have done – there invariably exists at least two functions within a chain: a combination of initiation and cadential, or initiation and continuation, or continuation and cadential. The problem arises when candidates could not discern between functions, and therefore could not fashion something that sounded remotely melodic.

Every single candidate recruited in this project listens to music on a regular basis, and therefore we can confidently assume that each one has at least a rough idea as to what constitutes 'a tune.'²⁸⁴ Given this assumption, it is reasonable to expect that a complication in identifying formal functions would render them unable to select a melodic opening, a middle and an end for their chain. In turn, this would result in either a meandering phrase of gigantic

²⁸⁴ Exposure results in more acute expectation and schematic understanding, as has been proposed by the likes of Leonard Meyer, *Emotion and Meaning in Music* (Chicago: University of Chicago Press, 1956); Narmour, 'Some Major Theoretical Problems'.

proportion (where clips are lumped together), or a collection of short, stop-start phrases (initiation and cadential, as it is considerably easier to categorise starting and ending points) that would end in plenty of 'leftover' materials, mostly continuation-like. In Table 71, having 'leftover' clips is cited frequently as an explanation to unfinished endings. Such clips are the result of poor thematic organisation.

7.7 Three-clip chain

A three-clip chain in the Classical premise used in this experiment may make an accurate prototype, but only if they fulfil the initiation – continuation – cadential sequence. Of course, there is a finite number of possible replication for such an order. If we were to calculate according to the hypothetical information relating to the sonata make-up given above:

Initiation: 12

Continuation: 13

Cadential: 8

Using the rule of product, the number of possible three-clip chunks consisting the initiation – continuation – cadential sequence is $12 \times 13 \times 8 = 1248$.

1248 seems like a huge number – it certainly represents a vast world of possibilities, simply for one puzzle. This, however, relies on a seamless two-fold process: identifying and selecting the correct function, and placing it in the right position within the sequence. Since not all functions are unambiguously written – an initiation function can come across as a continuation, and vice versa – there is not a 100% accuracy rate for this two-fold process. We must also not forget to factor in elements such as pitching ability, which will inevitably bring the number down by a considerable degree. Based on these considerations, it is therefore

highly improbable for sonata reconstructions to yield consistently logical three-clip sequences in strophic form.

All the impossibilities discussed above can likely be overcome by adopting the options marked 'likely.' Having clips that are four or five clips long, with the exception of a couple of extras in order to accommodate the odd-numbered data set, increases the likelihood of logical combinations and gives more leeway for freedom in selecting clips, and a greater margin for error, too.

Chapter 8: Perception of cadential strength and harmonic trajectory

8.1 Cadential strength

The prevalence of multiple of PACs in the answers collected for this experimental study suggest that cadential strength is not a natural element to be perceived in the realm of cadences. Whilst it is true that cadential function was mostly recognised as such by participants from all walks of expertise (as has been pointed out numerous times by existing studies²⁸⁵) – with the exception of postcadential gestures, that are by nature more prolongational than cadential²⁸⁶ – the difference in rhetoric, or the gravitas of the various types of cadence available did not seem to be something that was noticed: there are occurrences of weak PACs from local levels being used to end entire reconstructions, for example.²⁸⁷ These observations suggest that participants do not necessarily have the capacity to distinguish 'end' from 'stop' functions: 'formal "end" and rhythmic/textural "stop" may very well be associated in many cadential situations, but they are fundamentally different phenomena, both conceptually and experientially.'²⁸⁸

NM11's Mozart answer is a case in point: the final clip used is the ESC, which, whilst not technically the ending Mozart uses himself, is functionally and grammatically correct

²⁸⁵R. Eberlein, 'A Method of Analysing Harmony, Based on Interval Patterns or "Gestalten".', in *Music, Gestalt, and Computing: Studies in Cognitive and Systematic Musicology*, ed. by M. Leman (Berlin: Springer Berlin, 1997); Leonard Meyer, *Music, the Arts, and Ideas: Patterns and Predictions in Twentieth-Century Culture* (Chicago: Chicago University Press, 1967); B. Rosner and Eugene Narmour, 'Harmonic Closure: Music Theory and Perception', *Music Perception: An Interdisciplinary Journal*, 9 (1992), 383–412; David R. W. Sears; David Sears, 'The Classical Cadence as a Closing Schema: Learning, Memory, and Perception' (unpublished PhD thesis, McGill University, 2016); David Sears, William E. Caplin, and Stephen McAdams, 'Perceiving the Classical Cadence', *Music Perception: An Interdisciplinary Journal*, 31.5 (2014), 397–417 <<https://doi.org/10.1525/mp.2014.31.5.397>>; David RW Sears, Marcus T. Pearce, and others, 'Expectations for Tonal Cadences: Sensory and Cognitive Priming Effects', *Sage Journals*, 2018 <https://figshare.com/collections/Expectations_for_tonal_cadences_Sensory_and_cognitive_priming_effects/4327556> [accessed 13 April 2020].

²⁸⁶ Under form-functional theory, postcadential gesture is categorised under framing function. It is not the theme or the cadence per se, but an 'after-the-end' that nonetheless still forms part of the experience of a theme or a cadence. Furthermore, prolongation harmony that usually features tonic pedal often features in postcadential gesture. See Caplin, *Classical Form: A Theory of Formal Functions for the Instrumental Music of Haydn, Mozart and Beethoven*.

²⁸⁷ For an in-depth discussion on cadential strength and the difference between syntactical and rhetorical cadence, see Caplin, 'The Classical Cadence', 106–112.

²⁸⁸Caplin, 'The Classical Cadence', 97.

according to Sonata Theory²⁸⁹ – moreover, the ensuing music, i.e. post-ESC, in the original version is fully tonic prolongational, with no additional attempt at a genuine PAC. This makes NM 11's answer a compelling one despite not being 'finished' in the sense of matching Mozart's manuscript note-for-note. This type of in-between answer, especially when taken in consideration alongside the underlying strategy, expertise, confidence and formal awareness, can usefully tell us the following points:

- The audibility of the PAC hierarchy;
- The extent to which expertise and strategy (being systematic and logical in approaching the clips²⁹⁰) determines the audibility of said hierarchy.

The issue of cadential processing has been broached repeatedly in detail over the years by music psychologists, and most recently, too, by analysts. In 2018, Sears, Pearce, Caplin, and McAdams discovered that

the terminal note and chord events from perfect authentic cadences are more predictable than
(1) non-cadential events featuring tonic harmony in root position and supporting any scale

²⁸⁹ Unlike other formal theories, Sonata Theory rigorously specifies that sonata exposition and recapitulation are structurally concluded by the first PAC encountered after the onset of S-theme. Caplin, for example, highlights no such closure: 'from a formal perspective all PACs, no matter what their rhetorical expression, are structurally the same: each successfully closes its individual subordinate theme within the group'; see Caplin, *Analyzing Classical Form: An Approach for the Classroom*. I have taken Sonata Theory's perspective in sectioning the three puzzles due to its more rigorous boundary that enables greater differentiation and offers more nuance.

²⁹⁰ More of this will be discussed in the penultimate section on strategy.

degree in the soprano, and (2) non-cadential events featuring any other harmony and any other scale degree in the soprano.²⁹¹

Little, however, is known about whether the hierarchical system of PAC is at all audible. As Caplin has discussed in his article on Classical cadence, not all PACs are created equal, with some having limited scope, and others acting as global closures.²⁹² A by-product of the reconstruction exercise in this present study is the examination into the hierarchical nature of PAC, with results collected suggesting that the status and role of any PAC is not always apparent. In other words, it is more common to find PACs interpreted as mere endings without consideration as to their inherent clout in terms of closure.

In a very recent study, Sears, Caplin, McAdams, and Jacob Spitzer asked participants to listen to cadential excerpts of various kinds and rate the strength of their expectations.²⁹³ They discovered that cadential events that have the tonic as their goal, such as PAC and IAC, consistently receive higher ratings than incomplete ones based on dominant harmony, such as HC. The majority of participants from the present study demonstrated the same attitude towards cadential processing, thus reinforcing the existing body of scholarship on the issue. Sears et al.'s experimental set-up, however, did not take into account the various levels and rhetoric underlying the PACs presented to their participants, which means that there was no way of telling whether participants could distinguish the hierarchical levels present in the PACs of a sonata movement. On the other hand, the reconstructions in this present puzzle study allow us a glimpse into the audibility of PAC hierarchy, if any, through the way PACs are slotted into the answers.

²⁹¹Sears and others, 'Simulating Melodic and Harmonic Expectations for Tonal Cadences Using Probabilistic Models', *Journal of New Music Research*, 47.1 (2018), 29–52, 48.

²⁹² See Caplin, 'The Classical Cadence', 93.

²⁹³Sears, Spitzer, and others, 'Expecting the End: Continuous Expectancy Ratings for Tonal Cadences', *Psychology of Music*, 48.3 (2020), 358–75 <<https://doi.org/10.1177/0305735618803676>>.

8.2 Abbreviations used

Table 83 lists the abbreviations used in analysing the results. An example of usage:

OPMPoPrE (Mozart) denotes the combination OMT/Post-OMT/Postcadential/Sequential thirds/End; PoPc2 denotes the combination Postcadential/P cadential/P cadential; EEEDR (Haydn) denotes EEC or ESC/End/Response.

Table 83 Abbreviations used for endings MBH in Table 84

List of abbreviations – Mozart			
Pc	P cad	Po	Postcadential
O	OMT	Pr	Sequential thirds
PM	Post-OMT PAC	E	End
List of abbreviations – Beethoven			
Pc	P cad	C	Coda
EE	EEC/ESC	ED	End
List of abbreviations – Haydn			
R	Response on V		
EE	EEC/ESC		
ED	End		

8.3 Summary of multiple PAC events

Table 84 shows the prevalence of multiple PACs in various combinations in answers collect.

Since some pieces yielded quite a few combinations, I have highlighted those that recur for ease of reference and discussion. It is also more fruitful to dissect combinations that occur more than once, therefore I will only be analysing the events highlighted in bold in the discussion following the table.

Table 84 Multiple PACs in MBH

Mozart				Beethoven				Haydn			
	NM	S	F		NM	S	F		NM	S	F
PMPC	2			C2EE	2			EER	7	6	2
EDPC	4	2		PC2	6	2	1	EE2	1	1	
O2PM2Pc	1	1		C2	6	2	2	R2	2	4	
PoPr	1			CED	1	1		ED2	2	1	1
Opo	1			CPc	6	3	2	EDR	2	1	1
OPM2Pr	1			PcC2	1	2		EDEE	4	1	
OpC	5	1	1	EEPC	1	1		EDEER2	1		
PMED	1			CEDPC	1		2	ED2EER	1		
Pc2	1		1	CEEP	1			EER2			1
ED2Po	1			EEPc2	1						
OPrPc	2			EE2Pc	1						
EDPo	1			Pc3	2		2				

OPoPr	1			C2Pc2	1						
OPM	1			C3		3					
EDO	1	2	1	EEED		1					
EDOPoPr	1			Pc4		1					
PM2	1	1		CEE			2				
ED2	1		1	C3EE			1				
EDOPc	1										
OPoPc	1	1									
PMPc2	1										
EDPrPc		1									
PMPoPrPc			1								
EDOPMPcPr			2								
OPM2			1								
EDOPM2Pr			1								
EDPM			1								

- 1) Mozart: Understanding of the OMT system is not an instinctive ability, but one that needs to be instilled through formal training. Correct applications of the OMT principle exist among the answers, but few and far between. Answers such as those detailed in Table 84 are much more commonly encountered. Of course, one must bear in mind that the way in which the audio clips were spliced does not lend itself fully to natural comprehension, seeing as some cuts come across as unnatural.
- 2) That said, there is evidence to suggest that the first part of the OMT cadential system was perceived to be not as strong and therefore is in need of reinforcement: examples can be found in OPc, OPoPr, OPoPc, etc. This is in agreement with the theoretical understanding of OMT.
- 3) We see that some multiple cadential events in fact strengthen those original final bars that may not have been the strongest cadential iteration (simply prolongational): EDPc and EDO in the Mozart, as well as ED2, EDR and EDEE in the Haydn are examples of this.
- 4) Results suggest that hierarchical understanding is very low among candidates – the internal trend follows the expertise route as well as the level of complexity of each piece: generally fewer mistakes going up the expertise rank, but more

mistakes regardless of ability in the Beethoven and Haydn. Participants did not seem to be able to distinguish between local-level and global-level PACs – in the Haydn, for example, no obvious difference was noted between the PAC that is a response to the P-theme and the PAC that is either the EEC or ESC– instead lumping them into one event frame. In this sense, aural understanding of PAC seems to be closer to that intimated by Caplin than Hepokoski and Darcy in Sonata Theory, namely that PACs are structurally equal despite their rhetorical significance.²⁹⁴

- 5) Beethoven's multi-layered coda tactic was not decoded by most participants.

Despite some being able to infer the similarity between these fragments (hence C2 and C3, for example), very few decided to put all four together. Scattering them throughout the piece seems to have been the more popular option among all participants.

²⁹⁴ See Caplin, *Analyzing Classical Form*, 387.

8.2 Recognition of harmonic trajectory

In 1954, American pianist, musicologist and composer Norman Cazden wrote that a composition cannot be said to begin on the tonic 'because there is no functional relationship as yet that makes us accept that chord as having a tonic role, and the further progress of the composition may easily demonstrate that it is really in another key.'²⁹⁵ Cazden's words are particularly relevant in the context of this experiment: since each piece has been broken down into clips and arranged in random, participants had to parse functional contents on their own before being able to decide on a tonic key – this is unlike in the majority of existing cognitive research where candidates would indicate alterations or rate harmonic suitability given a set melody with a predetermined tonic, to name but two types of experiments.

Results collected suggest that listeners are capable of recognising initial tonic among randomly ordered clips in different keys, which is an observation that has not been previously discovered to the best of the author's knowledge. Accuracy in this category is judged based on the following criteria:

- Correct identification of the first clip, i.e. the opening melody in the tonic;
- Correct identification of the final clip, i.e. the final strain in the tonic;
- Correlation between the opening and ending, i.e. both must be tonic-based.

²⁹⁵N. Cazden, 'Tonal Function and Sonority in the Study of Harmony', *Journal of Research in Music Education*, 2.1 (1954), 21–34, 25.

Table 85 shows the number and percentage of participants who correctly assessed the harmonic trajectory in the three pieces:

Table 85 Awareness of harmonic trajectory in MBH

	Mozart			Beethoven			Haydn		
	I	E	IE	I	E	IE	I	E	IE
F	5	5	5	3	4	4	3	3	3
S	14	13	11	6	12	6	9	7	7
NM	10	16	10	9	14	8	11	2	2
Total	29	34	26	18	30	18	23	12	12
% F	83.3	83.3	83.3	50	66.7	66.7	100	100	100
% S	93.3	86.7	73.3	50	100	50	86.7	63.6	63.6
% NM	55.6	88.9	55.6	52.9	82.4	47.1	73.3	13.3	13.3
Total	74.4	87.2	66.7	51.4	85.7	51.4	85.2	44.4	44.4

Table 85 offers some interesting observations regarding awareness of harmonic trajectory. First of all, it is not surprising to see that overall, the highest proportion of accurate identifications occurred in the Mozart. After all, this sonata offers the clearest-cut signposts: balanced themes, fairly problem-free endings, and very few functional ambiguities.

Research has discovered that human beings are able to develop harmonic sensitivity and key membership awareness simply by being continuously exposed a particular musical culture.²⁹⁶ Studies have also shown that children as young as six years old were capable of demonstrating awareness of the full tonal hierarchy in simplified settings.²⁹⁷ Moreover, many scholars have also argued that 'harmonic structures confer a strong unity to tonal musical pieces because they instil hierarchical relationships between all the musical events of the piece.'²⁹⁸ The results projected in the table above confirm these findings inasmuch as

²⁹⁶ See L. J. Trainor and S. E. Trehub, 'A Comparison of Infants' and Adults' Sensitivity to Western Musical Structure', *Journal of Experimental Psychology: Human Perception and Performance*, 18 (1992), 394–402; L. J. Trainor and S. E. Trehub, 'Key Membership and Implied Harmony in Western Tonal Music: Developmental Perspectives', *Perception & Psychophysics*, 56 (1994), 125–32.

²⁹⁷ See L. L. Cuddy and B. Badertscher, 'Recovery of the Tonal Hierarchy: Some Comparisons across Age and Levels of Musical Experience', *Perception & Psychophysics*, 41 (1987), 609–20; J. R. Speer and P. U. Meeks, 'School Children's Perception of Pitch in Music', *Psychomusicology: A Journal of Research in Music Cognition*, 5 (1985), 49–56.

²⁹⁸ This idea is quoted from Tillmann and Bigand, 'Does Formal Musical Structure Affect Perception of Musical Expressiveness?' It is distilled from the works of Heinrich Schenker, *Free Composition*, trans. by E. Oster (New

individuals with no formal training in music theory could identify a home key and select a suitable beginning and ending in said key. Although not all participants were able to detect the harmonic blueprints in the three puzzles, most of them could, which supports the long-standing belief regarding the role and perception of harmony.

The tasks presented in this project are of course highly complex, but results displayed above suggest that recognising tonal hierarchy is a trait that is found in adults regardless of expertise. This supports existing research that has discovered that both sophisticated and amateur listeners are able to make relational distinctions between individual notes. For example, when asked to determine the fitness of a note to match a particular tonic, sophisticated listeners more often than not chose diatonic notes – particularly the tonic, third and fifth – as more pleasing than non-diatonic ones.²⁹⁹ Novice listeners, too, found the tonic to be a pleasing completion to a given sequence of notes.³⁰⁰

Although studies have progressed to the extent that we can ascertain the ability of listeners to select a harmonically suitable ending to a given beginning, scholarship has not been able to determine whether listeners can identify a starting tonic given a randomly arranged piece – this was discussed in Chapter 1.³⁰¹ Given the results in Table 85, we are one step closer to finding the answer to this question: it would seem that listeners, regardless of expertise, are able to recognise the reigning tonic among other harmonic shades.

York: Longman, 1979); Leonard Meyer, *Emotion and Meaning in Music*; Lerdahl and Jackendoff; Lerdahl, 'Pitch-Space Journeys in Two Chopin Preludes', in *Cognitive Bases of Musical Communication*, ed. by M. R. Jones and S. Holleran (Washington D. C.: APA, 1991), pp. 171–91.

²⁹⁹C. L. Krumhansl, 'The Psychological Representation of Musical Pitch in a Tonal Context', *Cognitive Psychology*, 11 (1979), 346–74; Krumhansl and Edward J. Kessler, 'Tracing the Dynamic Changes in Perceived Tonal Organization in a Spatial Representation of Musical Keys', *Psychological Review*, 89.4 (1982), 334–68 <<https://doi.org/10.1037/0033-295X.89.4.334>>; Krumhansl and Shepard, 'Quantification of the Hierarchy of Tonal Functions'.

³⁰⁰Krumhansl and Shepard, 'Quantification of the Hierarchy of Tonal Functions'.

³⁰¹Marvin and Brinkman.

8.2.1 Relationship between pitching ability and tonic perception

The ability to identify an overall tonic and select the appropriate keys for the beginning and ending does not seem to be closely related to pitching ability, which supports existing findings relating to pitching ability and aural perception.³⁰² Only four participants have absolute pitch: S2, S9, NM5 and NM11. Out of the four, NM5 managed to select neither the correct opening nor ending, and did not grasp the overall tonic implied in any of the pieces. The majority of participants who were successful in this grading criterion possessed relative pitch.

8.2.2 Relationship between expertise and tonic perception

Of course, this skill becomes sharper the more training an individual has: F-candidates consistently scoring highest in this category, followed by S- and NM-candidates. Again, this observation is consistent with previous findings in the field of harmonic perception. Corrigall and Trainor, for example, have reported that musical training explains musicians' superior performance in recognising out-of-key and out-of-harmony passages; investigations into brain activities in the face of harmonic concord and discord have also returned a similar conclusion.³⁰³ Although further research will have to be undertaken to determine the extent to which this was at all a conscious and non-arbitrary decision, it seems reasonable to conclude that the present study supports existing scholarship in suggesting that harmonic awareness is a skill that benefits from formal training.

³⁰² For example, see Ken'ichi Miyazaki, 'Perception of Relative Pitch with Different References: Some Absolute-Pitch Listeners Can't Tell Musical Interval Names', *Perception & Psychophysics*, 57.7 (1995), 962–70 <<https://doi.org/10.3758/BF03205455>>; Miyazaki and Andrzej Rakowski, 'Recognition of Notated Melodies by Possessors and Nonpossessors of Absolute Pitch', *Perception & Psychophysics*, 64.8 (2002), 1337–45 <<https://doi.org/10.3758/BF03194776>>; Kosuke Itoh and Tsutomu Nakada, 'Absolute Pitch Is Not Necessary for Pitch Class-Color Synesthesia', *Consciousness and Cognition*, 65 (2018), 169–81 <<https://doi.org/10.1016/j.concog.2018.08.010>>.

³⁰³ Kathleen A. Corrigall and Laurel J. Trainor, 'Effects of Musical Training on Key and Harmony Perception', *Annals of the New York Academy of Sciences*, 1169.1 (2009), 164–68 <<https://doi.org/10.1111/j.1749-6632.2009.04769.x>>; S. Koelsch and others, 'Differentiating ERAN and MMN: An ERP Study', *Neuroreport*, 12 (2001), 1385–89; Koelsch, 'Effects of Musical Expertise on the Early Right Anterior Negativity: An Event-Related Brain Potential Study', *Psychophysiology*, 39.5 (2002), 657–63.

8.2.3 Comparison between performances in Beethoven and Haydn

The most obvious difference in IE category can be found in the Haydn, where NM group scored very low in comparison to the other two demographic groups. This does not only support the argument regarding the linear relationship between training and harmonic awareness, but also implies the possibility that Haydn's overall logic could be particularly opaque for those without formal training. The emphasis on overall logic is important in this context, because it does not seem as if NM-candidates faced a huge challenge in identifying the opening tonic; as Table 85 shows, 73.3% of the population managed to do so. The real hurdle, then, is likely to be the process of connecting this initial aural image with an appropriate ending. Amidst the fragmentary style of this particular sonata, this is understandably a somewhat tall order for those with no training in academic music.

Interestingly, the results above suggest that participants found it easier to identify the primary theme to the Haydn than they did the Beethoven. There is a 33.5% gap – a sizeable difference – between the two pieces across all three demographics. Inter-demographic comparison also unanimously implies that the primary theme to the Haydn was more aurally accessible. Perhaps the most obvious explanation can be found by comparing the characteristics of the two themes: whilst the Beethoven is fragmentary, the Haydn is more clearly thematic. As has been noted throughout this chapter, the traits found in Haydn's primary theme are indeed those associated with primary themes from this compositional era.

8.2.4 Locating P-theme and initial tonic more difficult than selecting ending

Locating the correct primary theme, and by extension the correct overall tonic, seems to be a much more challenging task compared to locating the correct ending; this is especially true in the Mozart and Beethoven. As shown in Table 85, there are significant performance discrepancies between I and E in Mozart and Beethoven; the gap is more jarring in the Beethoven. It has been noted beforehand in Chapter 2 that Beethoven incorporates many false

endings in the form of multiple codas that are in themselves complete. As Table 86 shows, there are six cases out of ten alternative endings in the Beethoven that are attributable to the coda ploy – more than half of the alternative endings occurred because of this technical ruse. The over-availability of tonic-based cadences in Beethoven's sonata more than likely plays a part in enabling candidates to perform better with regard to selecting the correct ending.

Table 86 Total alternative endings in MBH

Total E: 40					
Mozart		Beethoven		Haydn	
Unspec	1	Coda 1	2	Resp: V	6
TR	1	Coda 2	2	End: V	5
P cad	1	Coda 3	2	ESC	2
Sequential thirds: I	2	ESC	1	ReTR	3
S: V	1	FMC	1	P	1
Postc: V	1	Postc: iii	2	Dev	2
S: I	1			MC: V	1
ESC	1				
Postc: I	1				

Meanwhile, the selection of opening is not as clear-cut, with the two thematic camps outfitted with back-to-front characteristics and frequent modulations – Table 87 clearly shows the various times participants mistook S-theme to be P-theme in its various harmonic guises.

Table 87 Total alternative initiation in MBH

Total alternative initiation: 40					
Mozart		Beethoven		Haydn	
TR/S: I	2	S: III	4	Adag/P	2
<i>TR/S: V</i>	6	S: VI	9	<i>Adag/EEC</i>	1
Dev: V	2	S: I	1	Ad/ReT/D	1
P: i	1	Recap MC	1	Dev	1
P cont/st	1	Coda 1	1	P cad/P	1
		FMC/P	1	<i>TR/ReT/P</i>	1
		Postc: iii	1	End: V	1
		P: f-VII	1		
		P cad: V	1		

Unlike the collection of codas that is mainly centred on the tonic, Beethoven's initiatory clips are more harmonically diverse, which results in more mistakes on the initiation front than on the cadential. Cazden's observation – 'the further progress of the composition may easily

demonstrate that it is really in another key³⁰⁴ – is an apt description of this piano sonata. In this regard, Beethoven's initiatory passages illustrate the 'new path' style well for its modified treatment of the Classical tonal grammar. Existing scholarship has suggested that listeners process harmonic trajectory in music based on common patterns.³⁰⁵ Considering that Beethoven's design upends conventional patterns, it is not surprising to see such results on this front.

8.2.5 Relationship between compositional style and harmonic perception

It seems that the selections of ending in the Mozart and Beethoven are much clearer than their initiations. The Haydn, meanwhile, remains an anomaly in this regard. This is perhaps something which could again be attributed to the fragmentary rhetoric of the piece. It is easier to determine the opening than the ending to this sonata inasmuch as there are more clips that are perceived to be much more continuatory or cadential in nature, therefore shining the spotlight on the few clips that are clearly thematic.

Initiation and cadential are two very different functions, but both have crucial roles to play in determining the harmonic trajectory of a piece. Results in this sub-section seem to suggest that having a sufficient amount of clearly defined melodic lines, which can be either initiatory or cadential, increases the chances of accurate harmonic judgement irrespective of training. Holleran et al. have found that listeners are capable of making harmonic inferences when given melodies that lack harmonic accompaniment, provided that the harmonic accompaniment – were it to be added – is unambiguous. In other words, a well-constructed melody by itself is likely harmonically unambiguous. Holleran et al.'s finding ultimately hints at the possibility that 'a melodic line, by itself, may be an important determinant of implied

³⁰⁴Cazden, 'Tonal Function', 25.

³⁰⁵Walter Piston, *Harmony*, ed. by M. DeVoto (New York: Norton, 1987); M. A. Schmuckler, 'Expectation in Music: Investigation of Melodic and Harmonic Principles', *Music Perception: An Interdisciplinary Journal*, 7 (1989), 109–50.

harmony.³⁰⁶ A piece that is dominated by fragments, such as the Beethoven and Haydn sonatas used in this project, seems likely to obstruct harmonic processing even if the overall harmonic arch is a simple I-V-I. This is consistent with findings that have shown that longer melodies are more likely to activate tonal representation, thus resulting in stronger tonal expectations.³⁰⁷

1. I-score is much higher for the Haydn than Beethoven³⁰⁸
2. E-score is higher than I-score in the Beethoven
3. E-score in the Haydn is considerably poorer and seems to be expertise-determined, with F-candidates scoring perfectly whilst the other two groups suffer
4. IE-score is overall better in the Beethoven

Point 1) suggests that clarity of thematic line is a crucial aspect in assigning the status of a main theme to a melody; by extension, this also includes tonic selection. With points 2) and 3), we see the role of clearly defined cadential passages in guiding listeners to a suitable ending that matches the overall tonic. Point 4) illustrates how overall harmonic understanding arguably depends on an ingredient that is lacking in the Haydn but can be found in abundance in Beethoven's Op. 31: repetition. Compared to Mozart's K. 283, both Beethoven and Haydn's sonatas are fragmentary, but Beethoven's features a significantly higher number of repetition that likely helps to anchor the various snippets in listeners' minds. Sean Hutchins and Caroline Palmer discovered that repetition benefits cognitive processing of music in spite of

³⁰⁶Susan Holleran, Mari Riess Jones, and David Butler, 'Perceiving Implied Harmony: The Influence of Melodic and Harmonic Context', *Journal of Experimental Psychology: Learning, Memory, and Cognition*, 21.3 (1995), 737–53 <<https://doi.org/10.1037/0278-7393.21.3.737>>, 745.

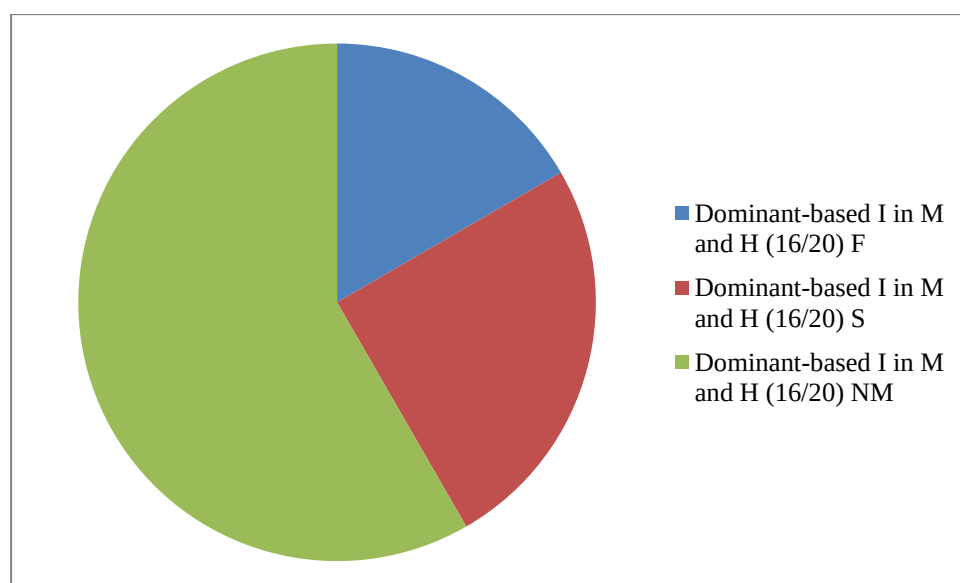
³⁰⁷Bharucha and Stoeckig; Barbara Tillmann, J. J. Bharucha, and E. Bigand, 'Implicit Learning of Tonality: A Self-Organizing Approach', *Psychological Review*, 107, 2000, 885–913.

³⁰⁸I score is also higher in H than in M. I would argue that this is not attributable to melodic quality, but to the fact that initiatory clips in H are much more obvious than in M by virtue of there being far fewer of them in the former. Furthermore, all initiatory passages in H are tonic-based, which is not the case in M.

previous findings.³⁰⁹ Per Holleran et al.'s argument and Caplin's form-functional theory, then, we can conclude that thematic design is crucial in aiding harmonic awareness on a more global level. The design of the melody matters: as we have seen, in the case of a more fragmentary melody, it is useful to rely on repetition to help anchor harmonic perception.

From the many alternative initiation cases outlined in Table 87, we can see that clips with underlying dominant harmony were often confused for true initiation. As has been suggested previously, the penchant to select a preparatory dominant as a means to launch a piece seems to be more closely linked to expertise, with NM candidates being the likeliest to display such a tendency, followed by S and then F candidates. The pie charts below illustrate this point:

Figure 27 Preparatory dominant as alternative initiation in M and H



³⁰⁹Sean Hutchins and Caroline Palmer, 'Repetition Priming in Music', *Psychology of Popular Media Culture*, 1.S (2011), 69–88 <<https://doi.org/10.1037/2160-4134.1.S.69>>. Their study refutes the findings in Bigand, Tillmann, Madurell, and others, 'Sensory versus Cognitive Components in Harmonic Priming', *Journal of Experimental Psychology: Human Perception and Performance*, 29 (2003), 159–71; Bigand, Tillmann, B. Poulin-Charronnat, and others, 'Repetition Priming: Is Music Special?', *The Quarterly Journal of Experimental Psychology*, 58A (2005), 1347–75.

As researchers have pointed out, the dominant-to-tonic progression is a very common sequence of event in Western music, so much so that even adults with no formal music instruction are able to recognise the tonal hierarchy implied in the progression.³¹⁰ The sense of expectancy created by the dominant necessitates a resolution in the form of tonic onset, and failure to fulfil this expectation may result in 'surprising or even unpleasant' sensation.³¹¹ As we can see in Table 87, candidates who selected dominant preparatory clips as their initiating clips went on to resolve these to tonic-based passages (texts in bold). The next-best solution would be to take the dominant as the overall tonic and resolve the preparatory clip onto another dominant-sounding clip– which is an entirely plausible scenario in the presence of a bifocal close at the end of the preparatory dominant, such as in the Mozart (TR/S:V) – or to apply secondary dominant principles as in the Adag/EEC sequence in the Haydn. Another secondary dominant example in the Haydn can be found in TR/ReT/P: V/V – descending bass by semitones to reach the tonic, also a form of dominant substitution – I. These findings are consistent with those reported by Tillmann, Bigand, and Madurell regarding the ability to perceive 'the syntactic functions of half and authentic cadences'.³¹² The fact that NM participants were also responsive to the dominant-tonic progression despite their lack of formal training also supports existing scholarship regarding the internalisation of harmonic hierarchy in such individuals.³¹³

³¹⁰ See Cuddy and Badertscher; Krumhansl and F. C. Keil, 'Acquisition of the Hierarchy of Tonal Functions in Music', *Memory & Cognition*, 10 (1982), 243–51.

³¹¹ Citation from Corrigan and Trainor, 'Musical Enculturation in Preschool Children: Acquisition of Key and Harmonic Knowledge', *Music Perception: An Interdisciplinary Journal*, 28.2 (2010), 195–200 <<https://doi.org/10.1525/mp.2010.28.2.195>>, 195; also see David Brian Huron, *Sweet Anticipation : Music and the Psychology of Expectation* / David Huron. (Cambridge, Mass.: MIT Press, 2006); and Leonard Meyer, *Emotion and Meaning in Music* (Chicago: University of Chicago Press, 1956) for further exposition on the nature of the dominant-tonic progression.

³¹² Tillmann, Bigand, and Madurell, 'Local versus Global Processing of Harmonic Cadences in the Solution of Musical Puzzles', *Psychological Research*, 61.3 (1998), 157–74 <<https://doi.org/10.1007/s004260050022>>, 169; also see Robert Francès, *La perception de la musique* (Vrin, 1984); Imbert, *L'acquisition Des Structures Tonales Chez l'enfant* (Paris: Klincksieck, 1969); B. Rosner and Narmour, 'Harmonic Closure: Music Theory and Perception', *Music Perception: An Interdisciplinary Journal*, 9 (1992), 383–412.

³¹³ See Tillmann and Bigand, 'Does Formal Musical Structure Affect Perception of Musical Expressiveness?'; Bigand, 'The Influence of Implicit Harmony, Rhythm and Musical Training on the Abstraction of "Tension-

Chapter 9: Summary of findings

9.1 The perceptibility of formal functions

The main question posed by the present study is whether the relationships described in Caplin's form-functional theory – assertions that aim to decipher and rationalise compositional decisions – are perceptible to listeners.³¹⁴ Regardless of expertise, participants demonstrated the ability to perceive formal functions used within the Classical tradition and organise them according to the tenets of the theory. Of course, the extent to which this is the case is determined by several external factors, such as training. In order to sharpen the musical ear, training is indispensable. This is consistent with previous findings in the field. The ability to perceive formal functions in Classical music 'relies heavily on the listeners' hearing of the subtleties of its structure, on the listeners' ability to read the code of the music'.³¹⁵ Nevertheless, it is heartening to discover that the gap between music perception and music theory and analysis is not without a bridge: the two are not out of sync with each other, after all.

Results from the present study suggest that whilst most higher-level observations (for example, overall harmonic or formal trajectory) are not aurally perceptible, especially to those without formal training, musical syntax is perceptible even to those who have not deliberately studied it. That local-level musical processing is far more ubiquitous than global-level, even when factoring in expertise, is in agreement with existing scholarship.³¹⁶ As reported in Granot and Jacoby's own puzzle experiments, participants were largely insensitive

Relaxation Schemes" in Tonal Musical Phrases', *Contemporary Music Review*, 9.128–139, 1994; Bigand and Marion Pineau, 'Global Context Effects on Musical Expectancy', *Perception & Psychophysics*, 59 (1997), 1098–1107.

³¹⁴Eugene Narmour, 'Some Major Theoretical Problems Concerning the Concept of Hierarchy in the Analysis of Tonal Music'.

³¹⁵R. Batt, 'Comments on "The Effects of Instrumentation, Playing Style, and Structure in the Goldberg Variations by Johann Sebastian Bach"', *Music Perception: An Interdisciplinary Journal*, 5.2 (1987), 207–13, 212.

³¹⁶E. Bigand and R. Parncutt, 'Perceiving Musical Tension in Long Chord Sequences', *Psychological Research/Psychologische Forschung*, 62 (1999), 237–54; Tillmann, Bigand, and Madurell; Tillmann and Bigand, 'The Relative Importance of Local and Global Structures in Music Perception'.

to global harmonic structures yet sensitive to thematic and motivic similarities.³¹⁷

Furthermore, the present study also confirms that puzzle segments are not ordered in random, i.e. the majority of listeners were able to differentiate and recognise most of the formal functions presented, and placed them accordingly in the musical frame. Also congruent with Granot and Jacoby's finding is the fact that accuracy improved with expertise in most cases.³¹⁸

9.1.2 The role of expertise

Of course, the extent to which this is so depends greatly on training. Whilst syntactical processing seems to be an inherent skill in our cognitive faculty, training serves to bring to the forefront of consciousness and improve the quality with which we comprehend music. Without training, musical understanding will be limited to passive, intuition-based, such as the kind typically found in NM participants' commentaries ('I organise it based on what I think sounds best.'). To identify anomalies such as syntactical reorganisation, or devices such as irony, listeners need to possess the sensitivity to recognise the following: firstly, that 'this event is false,' and that 'we implicitly treat the composer as a speaker who intends to communicate through a given [tactic]; secondly, they must believe that the composer's utterance is meaningful – as Peter Hoyt has put it, 'not only must the listeners be fooled, they must believe that they were *intended* to be fooled.'³¹⁹ To achieve this level of engagement and awareness, it is inevitable that training – and an extended one, at that – needs to come into the equation, for only with training can we sharpen our intellect and broaden our knowledge so that we are aware of such strategies.

³¹⁷Granot and Jacoby, 'Musically Puzzling II'.

³¹⁸Granot and Jacoby, 'Musically Puzzling I'; see also Lucy Pollard-Gott, 'Emergence of Thematic Concepts in Repeated Listening to Music', *Cognitive Psychology*, 15.1 (1983), 66–94.

³¹⁹Peter Hoyt, 'The "False Recapitulation" and the Conventions of Sonata Form' (unpublished PhD thesis, University of Pennsylvania, 1999), 30, original emphasis.

Expertise plays a part in nearly all the variables analysed in the present study. Although a great proportion of participants demonstrated recognition of formal functions, reconstructions submitted clearly show that expertise mattered when it came to functional organisation. Misreading and misplacing initiation, continuation, and cadential functions are traits that become more prevalent as we descend the expertise scale. The expertise scale is also related to the ability to decode the syntactical orthodoxy of a piece: answers submitted by expert participants showcase greater performance discrepancies than those by less expert candidates, which suggest that training contributes to the ability to detect unconventional practices. Discrepancy in performance decreases as we descend the expertise scale.

The two areas on which expertise does not seem to have any bearing at all are confidence level and recognition of harmonic trajectory. As I have mentioned in the previous chapter, confidence level seems to be a rather arbitrary yardstick by which to discuss results meaningfully. Although it has shed light on a few areas, confidence level and expertise do not seem to be correlated. Similarly, expertise does not seem to affect harmonic understanding: harmonic judgement seems to have been greatly aided by having clear-cut and tuneful melodic lines. No major performance gaps were found between the groups; rather, discrepancies in scores pointed more towards idiosyncrasies found in the pieces themselves – in other words, the piece, rather than the expertise of the person in question, influenced the processing of harmonic trajectory. As with the other parameters analysed in this study, training would inevitably sharpen one's ability to perceive harmonic goals in music. Similar to harmonic trajectory, cadential strength does not seem to be so much affected by expertise but by the individual design of the piece. Expertise seems to play more of a role here than in harmonic awareness, but trends derived from the results collected suggest that experts and non-experts alike committed more mistakes in the Beethoven and Haydn. This suggests that the pieces, rather than expertise, influenced the perception of cadential strength.

9.1.3 Awareness of musical form

In their second puzzle experiment, Granot and Jacoby suggested that a major advantage of the sonata form design is its ABA' layout. It is not the sonata's tonal design or process that aids cognition, but the fact that two comparatively more stable sections border an unstable middle. This is manifested in the fact that candidates consistently placed the development roughly in the middle of their reconstruction, each time 'at an above chance level.'³²⁰ Granot and Jacoby's finding is consistent with the idea of 'a convex contour of tension' that has been previously noted by others.³²¹

In this particular set-up, however, the ABA' layout did not seem to be as obvious to participants, especially to those without any training whatsoever. Unlike in Granot and Jacoby's experiments, the segmentation process in the present study presents functions and not sections, which means that candidates are faced with an extra challenge: they not only have to connect sections, but are required first and foremost to construct sections that can then be put together to form a piece. In this setting, the ABA' layout is not at all easily visible. F and S groups are significantly at an advantage here thanks to their formal training, but some of these reconstructions did not manage to realise the need for A and A' to be thematically identical: there are cases of P-space being recapitulated prematurely, which suggests that sonata form understanding is incomplete.

Confidence level analysis also yielded a similar observation. Using the 'dip' or 'similar' perspective, we saw how the majority of candidates demonstrated the former in their answers, which indicated that participants found it challenging to reconstruct a middle section despite being able to select appropriate-sounding beginning and ending. It is plausible that higher-level formal reconstruction, such as a whole development section in sonata form, is

³²⁰Granot and Jacoby, 'Musically Puzzling II', 75.

³²¹ See D. Cohen, 'Palestrina Counterpoint: A Musical Expression of Unexcited Speech', *Journal of Music Theology*, 15 (1971), 99–111; Huron; Roger Kamien, *Music: An Appreciation*, 4th edn (New York: McGraw-Hill, 1988).

connected to skills that are beyond the scope of mere form-functional awareness. In other words, form-functional awareness is limited in its scope as a yardstick by which we can determine the ability to build a full-scale work. Having said that, the purpose of this study is unlike Granot and Jacoby's: the present study has never aimed to explore the audibility of sonata form, merely the perceptibility of Caplinian syntax.

It is also safe to argue that negotiating formal geography does not seem to be a skill that naturally comes with expertise: expertise does play a huge part in determining one's ability to detect and reconstruct a formal type, but it does not necessarily guarantee success in this regard. It seems that formal awareness requires more than simply expertise – expertise must be combined with experience, as well as a good amount of creativity and awareness to apply abstract concepts on real-life situations.

A form that was frequently intimated in the reconstructions submitted is verse-and-chorus that is widely used in popular music. As has been discussed at length, this form, whilst structurally sound and more elegant than some of the too-long or too-short chains offered, is not well-suited for sonata-based puzzles as the latter are not composed of equally divided clips that would ensure balanced strophes. Successful reconstruction of sonata-based puzzles calls for the ability to think at global and local levels, to delay cadential points until suitable moments, and to take clips beyond face value. Quite often, participants demonstrated thematic awareness and the ability to recognise repetition by grouping similar clips together. This, however, only demonstrates low-level perception that does not factor in higher-level organisation. Understandably, higher-level thinking becomes more evident as we go up the expertise scale; however, this does not by any means suggest that F-candidates excelled in structural awareness – they performed better in comparison to S and NM groups.

Finally, none of the reconstructions collected demonstrates any awareness of the tension between sonata and sonata-rondo in the Beethoven. This is admittedly a high-level

understanding that requires both local- and global-level formal dexterity, involving an in-depth knowledge of thematic and harmonic workings in Classical sonata. Aside from being able to structure clips in an organised manner, one also needs to have the capacity to consider other forms related to the basic sonata form.

9.1.4 Awareness of formal functions

Misreading P- and S-themes in the Beethoven is more pronounced in S and F groups, which is likely attributable to expertise. Between S and F groups, more mistakes are made by S, who are arguably more used to form-functional thinking. They were caught unawares more often by Beethoven's upending of Classical principles. On the other hand, F group was not as affected, which means that the overall frequency of mistake, in descending order, would be S → NM → F.

The initiation themes that are most often misinterpreted as continuation are Mozart's CBI, Beethoven's rondo melody, and Haydn's P-theme. The first two are in line with the analyses made in Chapter Two, whereas the latter is likely due to the fragmentary nature of the sonata in general that offers no clear thematic hints.

Some cases of functional misreading came across as arbitrary, with the majority of CII being a good example. Two possible explanations for this phenomenon are the mere lack of stylistic understanding and lack of effort.

Leftover and pile-up are dominated by continuation clips. Leftover cases will result in unfinished ending; pile-up cases contain cadential endings stacked on top of one another – in other words, not at all elegant Classical endings.

Cases of unfinished ending suggest that balanced organisation is paramount in reconstructing a piece of music. Judging by the answers collected, however, balance was not at the forefront of candidates' strategy. This refers to the participants who reconstructed based on verse-and-chorus principles; those who were aware of the sonata nature of the puzzles

naturally could not aim for evenly divided chunks of clips. Poor thematic organisation and lack of awareness of symmetry contributed heavily towards unfinished pieces.

9.1.5 Effects of genre preference

Making sense of the various events in a piece of music requires listeners to tap into their pre-existing knowledge of the genre. Meyer, for example, has pointed out that although 'not wholly determined by the frequency with which a particular syntactic relationship has previously been heard, prediction (expectation) is nonetheless significantly dependent upon the listener's learned habit responses, which are a product of his past musical experience.'³²² It is therefore reasonable to expect that genre preference should affect the quality of reconstruction by any particular candidate. In reality, however, this has not been found to be the case: some candidates who do not at all listen to classical music were still able to decode the various formal functions on offer and place them moderately accurately. Meyer has suggested that aside from listening habits, a listener's sense of probability can also be attributed to 'the nature of human mental processes'³²³ – in other words, it is likely that human beings are predisposed to processing syntax as it is used in Classical style.

Of course, we have to take into account the fact that the participants recruited in this study were all enculturated within the Western musical tradition, and therefore it is more than likely that they have implicitly imbibed the syntax associated with this artistic branch.³²⁴ An in-depth discussion of this aspect of listening is beyond the scope of this dissertation, but it is worth mentioning that studies have shown how most members of a society are able to display the workings of their musical intuitions regardless of the presence of formal training.³²⁵ This

³²² Leonard Meyer, 'On Rehearing Music', 261.

³²³ See Leonard Meyer, 'Meaning in Music and Information Theory', *Journal of Aesthetics and Art Criticism*, 15.4 (1957), 412–24, 422; John Cohen, 'Subjective Probability', *Scientific American*, 197.5 (1957), 128–39.

³²⁴ For example, see Martin Rohrmeier and Patrick Rebuschat, 'Implicit Learning and Acquisition of Music', *Topics in Cognitive Science*, 4 (2012), 525–53.

³²⁵ E. Bigand and B. Poulin-Charronnat, 'Are We "Experienced Listeners"? A Review of the Musical Capacities That Do Not Depend on Formal Musical Training', *Cognition, The Nature of Music*, 100.1 (2006), 100–130

musicality explains the less-scientific responses collected from participants in both rounds. It is true that the participant pool for this study is entirely Western-centric and I do not intend for the claims made in this dissertation to be applied to the entire human race. Within the parameters of the study, Caplin's syntax seems to project the inner workings of our musical mind well.

9.1.6 Reconstruction strategy

As has been pointed out by human movement scholar Bruce Abernethy, decision-making is a complex chain of events with most of the work carried out well before the actual visible outcome itself.³²⁶ The same principle can be adopted here to give a different perspective when considering the answers that have been discussed thus far: they suggest functional awareness more than sequential awareness; a higher affinity for Mozart than Beethoven and Haydn, at least in the hear-ability and perceptibility domain; and confirmed the unorthodoxy surrounding Beethoven and Haydn's musical styles. That said, there is one more angle which needs to be considered before bringing this empirical discussion to a close: participant's strategy in solving the puzzles. The finished products submitted on paper do not and will never be able to do justice to the multiple layers of complex decision-making that would have taken place prior to the final reordering of each puzzle. There is arguably no way to determine in detail the ways in which each candidate processed each clip, and in turn, the relationship between their working process and their results. It is, however, possible to scrutinise their methodological reflections, from which we could detect clear glimpses of the inner workings of their cognitive faculty during these exercises.

Adopting a systematic working method seems to hold the key to achieving greater success in this experiment. Candidates who hinted at such a method in their methodological

<<https://doi.org/10.1016/j.cognition.2005.11.007>>; H. Honing, *Iedereen is Muzikaal. Wat We Weten over Het Luisteren naar Muziek* (Amsterdam: Nieuw Amsterdam Uitgevers, 2009).

³²⁶B. Abernethy, 'Visual Search Strategies and Decision-Making in Sport', *Journal of Sport Psychology*, 22 (1991), 189–210.

commentaries show better results than those who based their answers on the mood of individual clips, or their speed, etc. This is not just an ability that is prevalent in experts – aside from S10, who scored perfectly for all three puzzles, the best performance with regards to functional awareness across the three puzzles belongs to NM1: she scored 96.9% in the Mozart. At the point of task completion, NM1 was a final-year PhD candidate in cardiovascular science. Observing functional performance in the NM group, a pattern emerges whereby participants with a scientific background, who hinted more strongly at a systematic and compartmentalised thinking in their methodological reflection, scored just as well, if not better, than their non-scientific counterparts.³²⁷

This finding seems to refute the existing belief in the field.³²⁸ Previously, scholars have observed that top athletes tend to display 'quiet eye'³²⁹ period that is markedly different than those with lower expertise, i.e. as much as 62% higher than the latter.³³⁰ Perceptual strategies by expert performers tend to exhibit fewer fixation points and longer duration span paid to each fixation point, as opposed to non-experts who are more prone to flitting between more cues for shorter periods each time; of course, the former makes for a more efficient strategy.³³¹

³²⁷ Scientific background in this case refers to those who read STEM degrees at university.

³²⁸ It has always been believed that 'chunking,' or compartmentalising knowledge, is an organisational skill that experts use to construct a systematic and efficient mental dictionary, enabling them to select and deploy relevant information quickly at any given moment. Moreover, 'chunking' also lightens mental load, allowing experts to use the free capacity to process other information. See D. E. Egan and B. J. Schwartz, 'Chunking in Recall of Symbolic Drawings', *Memory & Cognition*, 7 (1979), 149–58; Fernand Gobet and others, 'Chunking Mechanisms in Human Learning', *Trends in Cognitive Sciences*, 5.6 (2001), 236–43 <[https://doi.org/10.1016/S1364-6613\(00\)01662-4](https://doi.org/10.1016/S1364-6613(00)01662-4)>.

³²⁹ The 'quiet eye' is defined as 'the final fixation or tracking gaze on a specific object or location in space before the unfolding of a final movement that is critical for performing successfully.' Quoted in André Klostermann, Ralf Kredel, and Ernst-Joachim Hossner, 'The "quiet Eye" and Motor Performance: Task Demands Matter!', *Journal of Experimental Psychology: Human Perception and Performance*, 39.5 (2013), 1270–78 <<https://doi.org/10.1037/a0031499>>, 1270; original argument in J. N. Vickers, Joan N., *Perception, Cognition and Decision Training: The Quiet Eye in Action* (Champaign, IL: Human Kinetics, 2007).

³³⁰ Derek T. Y. Mann and others, 'Perceptual-Cognitive Expertise in Sport: A Meta-Analysis', *Journal of Sport and Exercise Psychology*, 29.4 (2007), 457–78 <<https://doi.org/10.1123/jsep.29.4.457>>.

³³¹ A. M. Williams and others, 'Visual Search and Sports Performance', *Australian Journal of Science and Medicine in Sport*, 25 (1993), 55–65.

Of course, this is not to suggest that candidates who were not as systematically guided were unable to progress in their reconstruction. In fact, we must remember that approaching this type of experiment 'blind,' i.e. with little to no prior theoretical knowledge or presupposition whatsoever, could in fact give such candidates an edge over the experts by allowing them to appreciate each clip for what it is. Instead of attempting to match – sometimes forcefully – an excerpt to a concept previously learnt, 'blind' candidates would have had to approach these puzzles based largely on their instinct and musicality, regardless of whether or not the latter has been sharpened with the aid of practical music classes. Cognitive psychologist Vimla Patel and her colleagues, Guy Groen and Geoffrey Norman, investigated medical school curricula to determine whether inductive- and deductive-based approaches yield markedly different outcomes in would-be doctors.³³² Problem-based learning in medical school encourages medics to recognise patient's symptoms for what they are, rather than attempting to match them to an existing body of theory that prescribes what a symptom should actually suggest. Approaching medical science in this hands-on fashion was shown to contribute to a higher level of motivation, although this approach, which is an example of backward reasoning, falls short of expectations when it comes to ensuring a solid factual knowledge base that comes with a coherent curriculum. Nevertheless, answers based on backward reasoning can offer us the opportunity to see whether Classical syntax could in fact appeal to human comprehension at an instinctive level.

³³²Vimla L. Patel, Guy J. Groen, and Geoffrey R. Norman, 'Reasoning and Instruction in Medical Curricula', *Cognition and Instruction*, 10.4 (1993), 335–78.

9.2 The legacy of the Classical Holy Trinity

In the first chapter, I mentioned that the addition of a Haydn sonata to the experiment was borne out of two reasons: firstly, to investigate whether syntactical perception was largely Mozartean; and secondly, to explore aural perception of the Holy Trinity, namely whether Haydn is heard as unusual in an equal or even greater capacity in comparison to Beethoven's 'new path' based on the Classical syntactical standard that is largely Mozartean. Results analysis in Chapter Three suggest that Haydn's style was often heard as more ambiguous than Beethoven's 'new path', signalling that the former could well be the most trailblazing composer out of the three. It is curious then, that for many years, Haydn's contribution has often been seen as a comparison to Mozart's or Beethoven's, rather than as a worthy contender on its own.

Mozart, Beethoven, and Haydn are three names that characterise the Classical period in much the same way as Bach and Handel do the Baroque era; in fact, from as early as the start of the nineteenth century itself, the trio had already become a kind of 'watchword, a commonplace expression signifying musical excellence.'³³³ As Charles Rosen puts it,

it would appear as if our modern conception of the great triumvirate had been planned in advance by history: Count Waldstein's entry in Beethoven's album, written in 1792 as the young composer left Bonn for Vienna, famously assured Beethoven that he 'will receive the spirit of Mozart from the hands of Haydn.'³³⁴

Despite being lumped together as a household brand of sorts, they do not at all command the same amount of respect and veneration over the musical community, with Haydn often taking

³³³Daniel Heartz, *Mozart, Haydn, and Early Beethoven, 1781-1802* (New York: Norton, 2009), xvi.

³³⁴ Quoted in Elaine Sisman, "'The Spirit of Mozart from Haydn's Hands': Beethoven's Musical Inheritance", in *The Cambridge Companion to Beethoven*, ed. by Glenn Stanley (Cambridge: Cambridge University Press, 2000), pp. 43–63 <<https://doi.org/10.1017/CCOL9780521580748.005>>.

a back seat in favour of Mozart and Beethoven. Elaine Sisman has noted that Waldstein's letter above has often been interpreted (or misinterpreted) as belittling Haydn's reputation. Attempting to correct this perception, Sisman argues that

this flight of eloquence ought instead to be understood as emblematic of generational identification. [Waldstein] saw Haydn, already sixty, as simply not in need of “Mozart’s genius” because he had his own. He was already the patriarch of the musical world: as productive as he could possibly be and too old to complete Mozart’s work for him.³³⁵

Notwithstanding the fact that Haydn's reputation and career preceded those of Mozart and Beethoven, the fact remains that the works of the latter two seem to be shrouded in that much more prestige. Instead of Mozart and Beethoven being measured against Haydn, the opposite has for years taken place.

As mentioned at the outset, one of the objectives of this thesis is to investigate the aural perception of the Holy Trinity, namely whether Haydn is heard as unusual in an equal or even greater capacity in comparison to Beethoven's 'new path' based on the Classical syntactical standard that is largely Mozartean; within the parameters of this project, it appears that Haydn is heard as such. The fact that Haydn's style does not sit comfortably within the Classical mould has perhaps been the main reason for the comparatively lacklustre attention it has received. As Webster puts it, 'Haydn's music can be appreciated only by ignoring the concept of "Classical style"'.³³⁶ Adopting this point of view, however, leaves us somewhat stranded: such is the nature of Haydn's style that scholars have long been faced with 'the inability to define a core creative personality', the likes of which have been bestowed to Mozart and Beethoven. The fact that Haydn is

³³⁵Sisman, ““The Spirit of Mozart from Haydn’s Hands””.

³³⁶James Webster, ‘Haydn, (Franz) Joseph’, *Grove Music Online*<<https://www-oxfordmusiconline-com.ezphost.dur.ac.uk/grovemusic/view/10.1093/gmo/9781561592630.001.0001/omo-9781561592630-e-0000044593>> [accessed 29 July 2020].

recalcitrant in yielding his inner self [inevitably results in his music being] too often delineated with constant reference to the twin props of Mozart on the one side and Beethoven on the other. With almost comic frequency, Haydn is patted on the back for either matching Mozart or anticipating Beethoven rather than for being himself (whatever we might decide that to be); if anything, the equation should be reversed, chronologically speaking. Above all it is the success of Mozart's music that stands as an obstacle to the wider dissemination and understanding of that of Haydn, for whom Mozart has proved to be a posthumous Salieri (in the current sense).³³⁷

I began this thesis by alluding to Beethoven's 'new path' style, a style that takes as its starting point Mozart's Classical style that is blended with Beethoven's own syntax. As Jan La Rue has pointed out, however, Beethoven also owes a debt of gratitude towards Haydn:

The precocious talent of the young Beethoven nowhere shows more remarkable promise than in the musical evidence of his early understanding of Mozart and Haydn at the deepest levels. Stated in summary terms, *from Mozart he learned principles of hierarchic balance* that go far beyond primitive equivalencies such as 2 = 2 in a 4-bar phrase, the article of faith of every novice classicist. Beneath the infinite charm of Mozart's polished melodic surfaces, which even Beethoven could rarely equal, the younger composer saw as no others did the immensely complex balances of activity among all musical elements and at every structural level from cell to final growth. The evidence of Beethoven's remarkable powers of observation can be traced in his music: already in his twenties he showed that he could adapt and extend Mozart's controlled activity for his own expressive goals. *From Haydn he learned quite other lessons: the fascination of movement by motivic and dimensional exploration, the quest for new*

³³⁷W. Dean Sutcliffe, 'Haydn's Musical Personality', *The Musical Times*, 130.1756 (1989), 341–44 <<https://doi.org/10.2307/966030>>, 341.

*meanings and new timings in thematic ideas, which Haydn had long since pursued to remote and unsuspected destinations.*³³⁸

La Rue's paragraph can be taken as a neat summary of the individual contributions of the Holy Trinity to the Classical canon: balance and symmetry; ingenious thematic development; and the combination of the two in Beethoven's 'new path' and beyond.

The concept of irony was mentioned in Chapter 1 as one of the main pillars that support the premise of this project. Irony in music means a variety of perspectives and alternative readings, all of which highlight the different ways music can be appreciated despite seemingly belonging to a particular school of composition. Results collected in this study show that musical irony is less obvious in Mozart, more obvious in Beethoven's 'new path', and most obvious in Haydn. Evan Bonds noted how ironic music invites listeners to consider the dualistic existence of art; similarly, Webster has suggested that Haydn

deliberately courted a union of opposites: his 'popular' style that simultaneously addressed the connoisseur. 'If one wanted to describe the character of Haydn's compositions in just two words, they would be . . . artful popularity or popular (easily comprehensible, effective) artfulness' (*Triest*). No other composer – not even C.P.E. Bach or Mozart – had Haydn's gift of writing ostensibly simple or folklike tunes of wide appeal, and broadly humorous sallies, that concealed (or developed into) the highest art . . . One of the best early comments on Haydn's music was Gerber's: he 'possessed the great art of *appearing* familiar in his themes' (emphasis added): that is, their popular character is neither merely given nor a direct reflection of his personality, but the result of calculated artistic shaping . . . The duality between earnestness and wit is analogous to the 18th-century distinctions between connoisseurs ('Kenner') and amateurs ('Liebhaber'), and between traditional or learned . . .

³³⁸Jan La Rue, 'Multistage Variance: Haydn's Legacy to Beethoven', *The Journal of Musicology*, 18.2 (2001), 344–60 <<https://doi.org/10.1525/jm.2001.18.2.344>>, 344–45, my emphases.

These dualities characterize many of Haydn's works, groups of works and even entire periods.³³⁹

Webster has also pointed out that

Haydn's style can be understood as analogous to the duality in his personality between earnestness and humour . . . The crucial point, however, is that Haydn's popular style is not a simple projection of his personality, but his compositional 'persona' or 'musical personality', deliberately assumed for complex artistic purposes. Indeed 'wit' signifies intelligence as well as humour.³⁴⁰

It is perhaps this duality that has made Haydn's style so difficult to pin down, the consequence of which, inevitably, is the composer's music being unfavourably compared against the standards of the other two giants of his time. Whilst Beethoven is well known for his heroic narrative and Mozart for his elegant simplicity, Haydn is not so transparent – he is a figure whose music hovers bewilderingly, much like a strange species: fascinating, but not a comfortable concoction that can be labelled easily. In another article, Webster has argued that 'the concept "Classical style" was not compatible with an appreciation for the cultivation and expression of deep personal feelings [such as found in Haydn's music].'³⁴¹ In concealing 'deep personal feelings' in witty popular style, Haydn successfully erases hints of obvious drama. Contrast this with Beethoven's 'new path' whose mannerism, despite still being traceable to the Classical school, is more flamboyant. In an oft-cited letter to his father in 1782, Mozart wrote that 'to receive approval one has to write something so easy to understand that a coachman can sing it right off, or so incomprehensible that it pleases precisely because no rational person can understand it.'³⁴²

³³⁹Webster, 'Haydn, (Franz) Joseph'.

³⁴⁰Webster, 'Haydn, (Franz) Joseph'.

³⁴¹James Webster, 'Haydn's Sensibility', *Studia Musicologica*, 51.1/2 (2010), 13–27, 27.

³⁴²Quoted in Sisman, "The Spirit of Mozart from Haydn's Hands", 47.

This subtlety of style is arguably one of the reasons that Haydn's music has for the most part been under the shadow of Mozart and Beethoven. In the same letter from 1782 cited above, Mozart remarked that 'the mean [or middle ground], truth of all things, is known and valued no longer'. Jens Peter Larsen once quipped: 'I think Mozart stopped when it sounded awful... Mozart had a great sense of beauty, and I don't think he would overstep that limit.'³⁴³ Dean Sutcliffe noted that this remark, this

turn of phrase is revealing in view of the strain that dominates the perception of Mozart's artistic persona. This exchange also highlights one of the problems relating specifically to Haydn's piano sonatas: they are rarely performed with the panache they deserve . . . this inhibited and sometimes precious style is also frequently heard in the performance of Mozart's sonatas, but at least in this instance the style of performance plays to one of the more obvious attributes of Mozart's music: its prettiness . . . It is indeed a paradox that [Haydn,] who is always judged to be less sophisticated, both emotionally and technically, than Mozart should prove finally more recalcitrant in yielding his inner self.³⁴⁴

Hans Keller, too, could not resist the temptation of comparing Haydn with Mozart even when he was writing about the former's string quartets: 'there is little doubt that Mozart's wealth of melodic invention has a wider appeal than Haydn's wealth of harmonic invention: don't even serious music lovers consider Mozart a greater composer than Haydn, a more inventive, more moving one?'³⁴⁵ Keller's remark illustrates further the direct attraction offered by Mozart's music: his approachable melodies. Harmonic innovation, on the other hand, is more subtle and requires an attentive mind and ear.

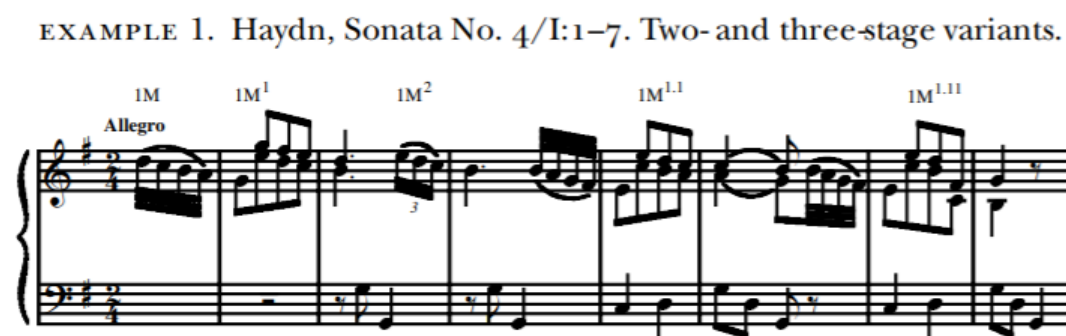
³⁴³'Problems of a Present-Day Haydn Performance', in *Haydn Studies: Proceedings of the International Haydn Conference, Washington D. C., 1975*, ed. by Jens Peter Larsen, Howard Serwer, and W. Dean Sutcliffe (New York: Norton, 1981), 293.

³⁴⁴Sutcliffe, 'Haydn's Musical Personality', 341.

³⁴⁵Hans Keller, *The Great Haydn Quartets* (London: Dent, 1985), 215.

Sutcliffe also pointed out that 'unlike Mozart, Haydn is much more prone to make us aware of the minutiae of time, whose flow he fills with a jigsaw puzzle of dynamic [and thematic] particles. His music sometimes seems to "live on its nerves"'³⁴⁶ – all of which perfectly describe the piano sonata that was used in this experiment. The reconstructions collected demonstrate how participants struggled to make sense of the temporal structure in this sonata: ironically, Haydn's tendency 'to make us aware of the minutiae of time' seems to have the exact opposite effect in this experimental setting. La Rue's article on multivalent thematic development in Haydn also illustrates Sutcliffe's 'jigsaw' idea well; the example below is the first illustration given by the author, showing the composer's multi-level thematic strategy:

Figure 28 Illustration 1 from La Rue, 'Multistage Variance: Haydn's Legacy to Beethoven', 346



Such an analysis indeed reveals the ingenuity with which Haydn carries out his thematic development. This is also seen in the first movement of Hob. XVI no. 22 that is used in this empirical study. Indeed, results collected in this experiment imply that such a strategy, combined with Haydn's penchant to juxtapose rather than synthesise materials,³⁴⁷ is not as aurally evident as Beethoven's 'new path' development.

This is another manifestation of the concept of musical irony in Haydn's music.

Furthermore, this also evinces the extent to which Haydn overturns our syntactical

³⁴⁶Sutcliffe, 'Haydn's Musical Personality', 343.

³⁴⁷Webster, 'Haydn, (Franz) Joseph'.

perception. Haydn's syntax does not sit neatly within one category, which naturally and understandably somewhat excludes his practices from being as rigorously disseminated in theory classes as those of Mozart. This, however, is a never-ending loop: because we are not usually exposed to Haydn's music, we grow to appreciate him less than, say, Mozart, which ultimately results in even less understanding of the former's style.

To attempt to understand Haydn's music by categorisation is therefore at best an unproductive endeavour, and at worst a futile undertaking. Rather than focusing on what is not there, we should look at the extant features and the way in which their organisation contributes to the ironic – that is, conversational – narrative of the music. In Chapter 1, I compared the advantages and disadvantages of Sonata Theory and form-functional theory, and noted that the former's preoccupation with existing norms might hamper an independent outlook on composer creativity; on the other hand, form-functional theory's emphasis on the organisation of building blocks imparts more flexibility in interpreting instances that do not conform to the general consensus. It is therefore more productive to speak of Haydn's music in terms of its syntactical organisation, from whose vantage point the dialectic inherent in the music may be more fruitfully observed.³⁴⁸

To compare Haydn's treatment of sonata form to the norm, or the Mozartean standard, is to miss the point.³⁴⁹ Jan Miyake observes: 'In the same way that we might discuss Beethoven's obsession with cadences as a compositional focus on "ends," Haydn is interested in "middles"'.³⁵⁰ Furthermore, she notes that from 'an analytical point of view . . .

³⁴⁸ See also Julian Horton's argument on a similar predicament facing the reception history of Mendelssohn: 'Stressing an allegiance to classical models is an act of misdirection, to the extent that it compels us to focus on melodic-stylistic features on the one hand, or on architectonic features on the other, whilst overlooking the syntactic new world that lies in between.' In 'Syntax and Process in the First Movement of Mendelssohn's Piano Trio, Op. 66', in *Rethinking Mendelssohn*, ed. by Benedict Taylor and Angela R. Mace (New York and Oxford: Oxford University Press, 2019), pp. 236–62, 262.

³⁴⁹ Also see a similar sentiment in Caplin, 'Beyond the Classical Cadence: Thematic Closure in Early Romantic Music', *Music Theory Spectrum*, 40.1 (2018), 1–26, 25: 'Most importantly, it is not a question of using the classical norms to show what is *wrong* with Romantic music, but rather to highlight what is *different* about it.'

³⁵⁰ Jan Miyake, 'Readdressing Haydn's Formal Models: Common Paths Through Expositions', *Theory and Practice*, 34 (2009), 31–46, 43.

understanding each [melodic construct as a pattern] of post-primary-theme decisions towards which Haydn *tends* to gravitate, a certain amount of "fuzziness" is encouraged. *Indeed, a strict interpretation of exposition-types would obscure important facts about Haydn's compositional style.*³⁵¹ Syntactical play and irony seem to be the two key ingredients in Haydn's music, as has been demonstrated in the empirical results reported in Chapter Three. Guido Adler once wrote:

To repeat an idea which has already been expressed in general terms, every cyclic work, and every movement of such a work, has, like a tree, a shrub, or a plant, its individual life, its peculiar structure, despite its appurtenance to a particular kind and form. It takes on the semblance of a musical personality. Haydn, though he conforms to this point of view or intention, contents himself with giving his music a 'moral' personality (*begnügt sich mit dem Begriff des 'moralischen Charakters'*). He keeps within the limits of purely musical expression, or, as the nineteenth century officiously called it, of 'absolute music.'³⁵²

Here, Adler hints at Haydn's thematic process as a live being that gives the music its personality and cements its status as an art form, as absolute music. It is therefore not so much conformity that is at play, or a nod towards tradition and convention, but creativity and dialectic. The freedom of expression that is found in Haydn's music can only be unlocked and transmitted effectively if we focus on the material itself and its life-cycle.

Perhaps an alternative look at Classical style could be one that is based on synthetic diversity, or each composer's unique formula in treating thematic materials. This approach emphasises individuality without losing sight of the overarching stylistic umbrella. After all, despite their differences, Haydn, Mozart, and Beethoven still recognisably belong to the same stylistic period. This perspective simultaneously lends structure and creativity, giving us a

³⁵¹Miyake, 'Readdressing Haydn's Formal Models', 44, second emphasis mine.

³⁵²Guido Adler, trans. W. Oliver Strunk, 'Haydn and the Viennese Classical School', *The Musical Quarterly*, 18.2 (1932), 191–207, 199.

framework within which to situate and contextualise our thoughts whilst allowing a non-dogmatic interpretation.

The approach of this empirical study has been syntax-focused. This has meant that no boundaries on subjectivity have been imposed. Whilst this has created a fair share of analytical problems, the design of the study has nevertheless highlighted the limitless ways in which listeners engage and communicate with musical material; conversely, the study has also highlighted the various possibilities offered by the musical material at hand. Eric Clarke once pointed out that 'the mixing of psychological and formal principles is [problematic in] that most psychological processes are rather subjectively variable, and appealing to them as if they had the fixity and objectivity of formal principles can be misleading.'³⁵³ Basing the segmentation on formal theories is arguably a rather effective method to mitigate the subjectivity that is inevitably present in empirical studies that involve listening exercises, inasmuch as the theoretical principles offer certain boundaries of expectations. Future emphasis on syntactical procedure could hopefully take this finding further in order to open more windows of possibility into understanding Classical music and its quirks.

Haydn once declared: 'Art is free and will be limited by no artisan's fetters';³⁵⁴ he also remarked to Georg van Griesinger that he 'was cut off from the world, nobody in my vicinity could upset my self-confidence or annoy me, and so I had no choice but to become original.'³⁵⁵ As has been shown in this experimental study, Haydn's originality and artistic freedom certainly are evident, and at times, much more so than Mozart's or Beethoven's. With this in mind, the long-standing notions of Mozart as the Classical genius and teleological narrative surrounding Beethoven's career as a Classicist/Romantic are perhaps worth a reconsideration. Daniel Hertz wrote that 'Haydn built the house and Mozart turned it into a

³⁵³Clarke, 'Mind the Gap: Formal Structures and Psychological Processes in Music'.

³⁵⁴ Quoted in Sisman, "The Spirit of Mozart from Haydn's Hands", 52.

³⁵⁵Webster, *Haydn's 'Farewell' Symphony and the Idea of the Classical Style: Through-Composition and Cyclic Integration in His Instrumental Music*.

palace';³⁵⁶ to this, Joan Gonzales added that Beethoven 'made this palace his home.'³⁵⁷

Perhaps a more insightful perspective would be to view the three as equal shareholders in a corporation, each with his own genius that ultimately ensures the legacy of the institution.

9.3 Theory and analysis as a foundation for musical understanding

I have favoured a hybrid approach in this study, i.e. a combination of theory-based analysis and empirical study, and believe that this goes some way towards clarifying the knowledge gaps exposed by existing scholarship in both the theoretical and empirical fields. In this section, which is divided into six parts, I will argue for the importance of theory-based analysis in musical scholarship as a framework for a more objective musical understanding, and the discipline's function as a tool for safeguarding the intrinsic value of music scholarship and the status of music as an artwork.

I will begin by outlining the advantage and implication of this hybrid approach towards music cognition (4.3.1), before considering the bi-directional nature of musical listening (4.3.2). By bi-directional, I mean a listening process that involves both objective and subjective perspectives, which I believe results in a more nuanced experience. The inclusion of objective perspectives, however, necessitates the presence of a framework (4.3.3) that allows scientific falsification, which is theory-based analysis. This framework mitigates the ontological ambiguity of music, allowing us to categorise (4.3.4) and examine it from various angles (4.3.5), which ultimately means safeguarding music from slipping into a purely subjective territory that is subservient to issues of taste, class, and commodification (4.3.6).

³⁵⁶Heartz, *Mozart, Haydn, and Early Beethoven*, 789.

³⁵⁷Joan G. Gonzalez, review of *Review of Mozart, Haydn and Early Beethoven, 1781-1802*, by Daniel Heartz, *Eighteenth-Century Studies*, 43.4 (2010), 540–41, 541.

9.3.1 The hybrid approach: advantage and its implication towards cognitive understanding

Findings from this study suggest that music is indeed heard in a systematic way. Classical syntax is not just systematic on paper – the patterns and logic outlined in Caplin's form-functional theory are strongly suggested to have influenced the way music is organised in the minds of listeners.

Results collected in this study go a step beyond the pattern recognition processes that have previously been confirmed by cognitive scientists: not only are we capable of distinguishing the different temporal elements in music, we are also equipped to recognise the characteristics that make these temporal elements what they are. In other words, this study shows more clearly what qualities of music influence our temporal perception of music. Moreover, this research also allows investigation into the various levels of temporal understanding that take place in real-time listening within the Classical parameters.

These positive findings suggest the benefit of combining theory, analysis, and empirical study in investigating music perception. Such a hybrid foundation also prevents this empirical study from slipping into the ambiguities that are commonly found in the existing body of cognitive research. The following tactics distinguish this project from its predecessors:

1. The segmentation process adopted in this project prioritises the functionality found in each phrase over the placement of the phrase itself in the music.
2. Segments are made deliberately short to emphasise the functional individuality of each segment. Rather than relying on the overall impression made by an entire

section, such as in Granot and Jacoby's puzzle experiments,³⁵⁸ participants will have to consider each phrase for what it is before placing it in their answer.

3. The standalone nature of each phrase is advantageous when investigating harmonic awareness: participants will have to rely on the harmony indicated in each phrase and proceed to connect the dots, so to speak, in order to build a full harmonic picture for their answer.

Findings from the present study also suggest that the features that act as syntactic signposts in Caplin's form-functional theory are audible. Furthermore, the fact that individuals without formal training were capable of demonstrating a comparably acute functional awareness to that shown by their expert counterparts suggests the possibility that human beings are internally equipped with the means to process Classical syntax coherently.³⁵⁹

As mentioned in the first section of this chapter, I have based this argument on a set of respondents that has been largely exposed to Western musical genres. The majority of respondents in this study are Music undergraduates from the same university, and despite some significant background differences – some participants grew up in Asia, for example – all of them have been exposed extensively to Western genres. Furthermore, this study has only made use of three pieces from the Classical period, a sample size that is not at all representative of the Classical oeuvre. Naturally, these pose obvious limitations to the present study, and in no way do I suggest that claims made so far are applicable to every single human being on the planet, or that they are applicable to every single piece in the Classical style. Within the parameters already set out, however, there is a chance that their cognitive understanding of music has been structured in the way that Caplin has demonstrated. In other

³⁵⁸ See Granot and Jacoby, 'Musically Puzzling I'; Granot and Jacoby, 'Musically Puzzling II'.

³⁵⁹ I use Classical syntax in this argument for two reasons: firstly, as it is the basic premise of this project; and secondly, as it is one of the simplest and most basic grammatical styles in the history of Western music (cf. Bach's counterpoint, for example).

words, Caplin could well have illustrated the inner workings of the human mind when presented with a piece of music.

9.3.2 Bi-directional musical understanding

In Chapter 1, I referred to Leonard Meyer's argument that disputes the doubtful intellect-affect, mind-body dichotomy: 'Our emotional responses to the world are invariably linked to cognitive patternings. Conceptualisation [therefore] precedes and qualifies affective experience.'³⁶⁰ Based on the results collected in this project, I would like to take Meyer's argument a step further and speculate as to the possibility that music theory, specifically Caplin's *Formenlehre*, is in fact the brainchild of our cognitive patterning. In other words, human beings have a tendency to process Classical syntax the way Caplin's form-functional theory has described it. Whether or not this tendency comes to the fore is dependent on the environment in which we operate as well as any training received.

Based on this thread of thought, I am going to argue for the indispensability of theory and analysis in our pursuit of musical understanding. In our quest to understand music, the world of scholarship has been largely divided into two: those who wish to understand the music itself for what it is (for example, music analysts) – 'a piece of music is a mentally constructed entity, of which scores and performances are partial representations by [which] the piece is transmitted'³⁶¹ – and those who wish to understand music as it is perceived by human beings and according to its place in society and culture (for example, ethnomusicologists and proponents of New Musicology) – 'music [as] a product of human activity'.³⁶² The bi-directional listening that I propose is a combination of the two: if there is one thing that I would like to serve as take-away from the present study, it is that neither can exist without the other, and that a fruitful appraisal of music should involve both modes of

³⁶⁰Leonard Meyer, *Explaining Music: Essays and Explorations*.

³⁶¹Lerdahl and Jackendoff, *A Generative Theory*, 3.

³⁶²Lerdahl and Jackendoff, *A Generative Theory*, 2.

understanding. To understand music is to understand music for what it is and for the various effects it can wield on its listeners, who in turn respond to the stimuli offered. We cannot fully process an experience by simply attending to our response to the stimulus – we must also observe the stimulus and its source to make sense of our response.

Kerman famously called for an 'analysis [that] provides a less one-dimensional account of the artistic matters at hand',³⁶³ of which an example could be, as Robert Morgan has suggested, one that

must examine the composer's intentions in relation to their compositional realization, must discuss the implications of the compositional system in regard to the music it generates, consider how the resulting music relates to older music and to other present-day music, examine its perceptual properties and problems, etc.³⁶⁴

These, of course, are in response to Kerman's accusation of music analysis being solely preoccupied with the idea of unity and organicism in music, an idea that remains controversial to the present day.³⁶⁵

Analysis, however, does not necessarily seek out to understand only unity. Extra-musical associations and meanings are derivations that can be made from carrying out musical analyses, and so are idiosyncrasies that point away from unity. More recently, Jonathan Kramer writes:

Disunity needs to be appreciated not only as the absence of unity, but also as a musical experience in and of itself . . . Analyses that seek to understand the means and purposes of

³⁶³Kerman, 'How We Got into Analysis, and How to Get Out', 331.

³⁶⁴Robert P. Morgan, 'On the Analysis of Recent Music', *Critical Inquiry*, 4.1 (1977), 33–53, 51.

³⁶⁵ More recent version of this debate can be seen in, for example, Robert P. Morgan, 'The Concept of Unity and Music Analysis', *Music Analysis*, 22.1 (2003), 7–50.

musical disunity . . . do indeed offer listening strategies to deal meaningfully with experiences of musical conflicts and inconsistencies.³⁶⁶

A comprehensive analysis of a piece of music should indeed not overlook contextual information, but I believe that understanding the object of scrutiny – the unities and disunities that make it what it is – constitutes the initial step towards a fruitful contextual investigation. Contextual and extra-musical understanding alone will not provide a thorough look into the object itself.

9.3.3 A framework for scholarship

In this context, I see theory-based analysis as a tool that enable us to scrutinise and understand the source to which we are responding. Theory-based analysis will not fully account for the music or our response to it, but it offer a degree of tangibility and objectivity – a scientific starting point – that helps to mitigate music's ontological problem and facilitates meaningful discussion about music.

The discipline's scientific capability, however, has not been free from criticism. In his famous article, Kerman also writes: 'I should prefer to believe that at least part of the problem stems from the prestige of analysis – or, to put it more accurately, from the genuine power of analysis which is the source of that prestige.'³⁶⁷ The capacity of analysis to corroborate opinions and critiques about music is arguably to be welcomed and not disdained, especially considering the main challenge that music poses: its ambiguous nature. We need to impose a framework for understanding to mitigate this ontological challenge, and analysis is one reliable means we can use to facilitate an objective and meaningful discussion of music.

By imparting a conceptual framework, theory-based analysis offers a solid grounding on which we can flexibly conduct teaching, learning and discourse. Rather like a recipe, it

³⁶⁶ Jonathan Kramer, 'The Concept of Disunity and Music Analysis', *Music Analysis*, 23.2 (2004), 361–72, 362.

³⁶⁷ Kerman, 'How We Got into Analysis, and How to Get Out', 321.

provides a step-by-step guide in approaching music, which helps shape our thought process. The presence of a solid grounding, a concrete starting point with clearly defined markings, is especially crucial considering the art form that we are studying. The very nature of music itself – intangible yet audible, visible, doable, legible, subjective yet objective – requires the use of a lingua franca in order to be debated meaningfully and critically. Introducing theory to the study of music helps to 'orient perception: how we see, imagine, and speculate about things.'³⁶⁸ This is not to say that we are to commit ourselves to one particular theory – I simply mean that having a theory as a starting point is beneficial and constructive.³⁶⁹

This argument is not meant to put music scholarship into a straitjacket by discouraging creative improvisation or putting an end to the 'doing' and 'listening' elements of the field – the results analysis of the present study itself showcases the necessity of including subjective interpretation to make sense of the data at hand. I am merely arguing for the necessity to establish a framework that takes into account the object under scrutiny itself. Critical discourse in music should first and foremost be driven by the musical components themselves. It is of course perfectly natural to rely on intuition when responding to a musical work, but we cannot discuss our response meaningfully with others without critical analysis. As Swanwick argues, 'There must be declared criteria [which should] be steady enough to limit arbitrary judgements.'³⁷⁰ If analysis constitutes a critical discussion of music, then basing it on a theoretical framework delineates the parameters for such a discussion. After all,

the basic processes of repetition and contrast, with the derived devices of variation,

transformation and re-positioning, are common across the musics of the world: their roots lie

³⁶⁸William David Hart, 'What Is Theory?', *Soundings: An Interdisciplinary Journal*, 95.2 (2012), 141–48 <<https://doi.org/10.5325/soundings.95.2.0141>>, 146.

³⁶⁹ Here, I am aware of the potential to be judged as making a politically charged statement condemning human race to thinking in one particular way only. This is by no means my intention. No academic discussion can be had without grounding one's argument in a scientifically accepted basis, which is precisely what I am doing.

³⁷⁰Swanwick, *Music, Mind, and Education*, 150.

in the psychological universals of human perception, the ways in which we all seek to organise experience into meaning and coherence.³⁷¹

9.3.4 Using categorisation to search for meaning

This need to categorise experience, to reduce chaos, has been well-noted by scholars.

Categories serve to mediate our interaction with the world, which in turn facilitates our perception by structuring the various events we encounter.³⁷² Child health researcher Marc Bornstein and psychologist Martha Arterberry state that inasmuch as the world offers 'an infinite variety of stimulation and is incessantly changing[, as well as posing] a constant biological flux [through which we experience the world,] variation must be reduced if perception and cognition are to proceed with organisation, order, and coherence.'³⁷³

Categorisation strongly aids 'the storage and retrieval of information' as well as ensures an efficient memory system.³⁷⁴

The philosopher Karl Popper devises three types of worlds into which we can categorise our perception: the first being the world of physical states and events; the second being the world of mental states; and the third being the world 'of theories in themselves, and their logical relations; of arguments in themselves and of problem situations in themselves'.³⁷⁵ It is in the third world that music and scholarship belong. Swanwick has called this third world 'inevitable' and compared its existence to a spider's imperative for making webs: 'So you and I make theories, seeking explanations, looking for organising principles by which to

³⁷¹Swanwick, *Music, Mind, and Education*, 100.

³⁷² See Linda B. Smith, 'A Model of Perceptual Classification in Children and Adults', *Psychological Review*, 96.1 (1989), 125–44 <<https://doi.org/10.1037/0033-295X.96.1.125>>; M. H. Bornstein, 'A Descriptive Taxonomy of Psychological Categories Used by Infants', in *Origins of Cognitive Skills*, ed. by C. Sophian (Hillsdale, New Jersey: Erlbaum, 1984), pp. 313–38; Stevan Harnad, *Categorical Perception: The Groundwork of Cognition* (New York: Cambridge University Press, 1987).

³⁷³M. H. Bornstein and M. E. Arterberry, 'The Development of Object Categorization in Young Children: Hierarchical Inclusiveness, Age, Perceptual Attribute, and Group versus Individual Analyses', *Developmental Psychology*, 46.2 (2010), 350–65, 350.

³⁷⁴Bornstein and Arterberry, 'The Development of Object Categorization', 350.

³⁷⁵Karl Popper, *Objective Knowledge* (Oxford: Oxford University Press, 1979), 154.

have, to hold and to interpret experience . . . If we did not, we would hardly survive from day to day.³⁷⁶ Theories guide our expectations by which we rely to operate in our daily life.³⁷⁷

Popper says that it is 'from our boldest theories, including those which are erroneous, that we learn most'.³⁷⁸ Being theoretically aware is not a requirement that is limited to the educational sphere for the sake of passing assessments. It has been shown that those in the possession of knowledge (and perhaps training, too) tend to see 'basic deep structures underlying a vast range of possible surface structures'.³⁷⁹ Clearly, this refers to the idea of conceptualisation. Music occupies a rather special domain in this type of discussion since it is an art form that can be perceived by anyone with aural capabilities; following aural perception, response will follow, and said response can be based on a number of factors, such as emotion or intuition. What, then, is the role of theory-based analysis? Theory-based analysis enables the intuitive 'sensori-motor intelligence, thinking "with the body", develop into "conceptual intelligence"'.³⁸⁰

The Swiss psychologist, Jean Piaget, specifies four conditions for the development of conceptual intelligence:

1. We find ways of internally representing actions to ourselves, instead of actually having to do them (we form images of running down a stream, leaping over it and balancing ourselves). This speeds up the action.
2. We recognise the relationships between these internalised actions (we run, then leap, then balance). A certain series here can be reversed in thought.

³⁷⁶Swanwick, *Music, Mind, and Education*, 7.

³⁷⁷ See Markus Neuwirth, 'Surprise Without a Cause? "False Recapitulations" in the Classical Repertoire and the Modern Paradigm of Sonata Form', *Zeitschrift Der Gesellschaft Für Musiktheorie [Journal of the German-Speaking Society of Music Theory]*, 10.2 (2013), 259–91 <<https://doi.org/10.31751/722>>, 261.

³⁷⁸Popper, *Objective Knowledge*, 186.

³⁷⁹Jan Nespör, 'The Role of Beliefs in the Practice of Teaching', *Journal of Curriculum Studies*, 19.4 (1987), 317–28 <<https://doi.org/10.1080/0022027870190403>>, 323. Experts and novices have been shown to approach problems differently; see Michelene Chi, Robert Glaser, and Ernest Rees, *Expertise in Problem-Solving* (University of Pittsburgh: Learning Research and Development Centre, 1981).

³⁸⁰Swanwick, *Music, Mind, and Education*, 48.

3. We supply a system of signs – such as language (we have a vocabulary: 'run', 'leap', 'balance').
4. We share our thinking in a community of minds. You can experience something of my thoughts.³⁸¹

Having a theory of music that is in turn used to analyse the art form is, in many ways, akin to Piaget's four points above.

1. Caplin's attempt to form a taxonomical overview of the types of function available in Mozart, Haydn and Beethoven's music is very much related to Piaget's first point: 'running down a stream, leaping over it and balancing' are akin to examples of the various events in a sonata; by categorising these events, Caplin has enabled the internal representation of these events.
2. Within each type of formal function, we recognise traits that unify the type as what it is. This enables a two-way identification process, i.e. typological identification can be followed by examples, or vice versa.
3. This gives birth to a theory of formal function, the language that forms an umbrella for the terminologies from the previous point.
4. Using this language, we can carry out meaningful discussion with others.

The application of theory and analysis in music scholarship enables us to strike two birds with one stone: it offers a two-pronged approach that facilitates flexible thinking through the use of conceptualisation, as well as encourages active engagement with the subject through critical discourse. Critical discourse, in turn, is advantageous when discussing music

³⁸¹Jean Piaget, *Play, Dreams and Imitation in Childhood* (London: Routledge, 1951), 238-39.

inasmuch as it provides the opportunity for falsification,³⁸² which is all the more important if we consider the elusive nature of the art form.

9.3.5 Flexible listening

With its emphasis on multi-level observation and criticism, analysis fosters critical and logical thinking. It is therefore a crucial discipline, not only for its potential to help researchers and enthusiasts discover more of what music holds, but also for its ability to train the mind. Theory-based analysis injects a dose of rigour and scientific credibility to an area of inquiry that can all too easily be dismissed as 'the leisure part of education';³⁸³ after all, education itself refers to 'directed and purposeful learning'.³⁸⁴ As Cardinal John Newman says, 'stuffing birds or playing stringed instruments is an elegant pastime, and a resource to the idle, but it is not education; it does not form or cultivate the intellect.'³⁸⁵ We have to recognise that discussing music as scholars is, as Swanwick has put it, 'to assess, to weigh up, to appraise . . . to accept that [scholarship is a form of] criticism.'³⁸⁶

The multi-level perspective afforded in Caplin's theory, for example, is not only a useful tool for composers wanting to organise their thought process or generate coherent ideas, but also functions as an aid for systematic thinking, a skill that is highly prized and applicable in our world. In turn, the musical insight afforded by this listening method will hopefully spark a meaningful and lifelong relationship with music, one that is motivated by a genuine interest in and appreciation for the inner workings of the art form.

³⁸² I follow Popper's scientific criterion as outlined in Karl Popper, *The Logic of Scientific Discovery* (New York: Basic Books, 1959). As a disclaimer: 'Although circumscribing science via falsification is naïve, the alternatives seem both unduly complicated and with too many substantive problems'; see Root Gorelick, 'What Is Theory?', *Ideas in Ecology and Evolution*, 4 (2011) <<https://ojs.library.queensu.ca/index.php/IEE/article/view/3506>> [accessed 25 June 2020], 3; with ideas based on the works of D. Shapere, 'Evolution and Continuity in Scientific Change', *Philosophy of Science*, 56 (1989), 419–37; and P. Feyereabend, *Against Method: Outline of an Anarchistic Theory of Knowledge* (London: New Left Books, 1975).

³⁸³ Herbert Spencer, *Education* (London: Williams & Norgate, 1911), 32.

³⁸⁴ M. Frank Pajares, 'Teachers' Beliefs and Educational Research: Cleaning up a Messy Construct', *Review of Educational Research*, 62.3 (1992), 307–32 <<https://doi.org/10.2307/1170741>>, 316.

³⁸⁵ Cardinal John Newman, *On the Scope and Nature of University Education* (London: Dent, 1971). 136–37.

³⁸⁶ Swanwick, *Music, Mind, and Education* (London and New York: Routledge, 1988), 149.

In advocating for a meaningful, lifelong engagement with music, Judith Jellison states that the 'probability of transfer of valued skills and knowledge from school music contexts to out-of-school adult music contexts will be increased [when] students learn . . . more *deeply and thoroughly* [and] when students learn *meaningful principles* rather than isolated facts and skills.'³⁸⁷ To my mind, this is a clear indication of the need to teach music via theory-based analysis. Caplin's form-functional theory, for example, illustrates Jellison's points very well: this is a theory whose principles are clearly shown to have been derived from examples. In such a setting, students learn how to apply principles learned from the outset as well as the importance of internalising said principles – in other words, they learn to think in a flexible way, guided by only a few tenets rather than abiding rigidly to a myriad of facts that are not integrated within a network. As Jellison puts it: 'When students learn principles that explain [the] why and how . . . they are better prepared to make appropriate adjustments and decisions independently.'³⁸⁸

This mental agility is especially pertinent when it comes to studying music, for no two case studies are the same. Coupled with the fact that no two listeners hear identically, the importance of flexible and systematic processing that is based on a clearly defined set of principles cannot be emphasised enough.

Having a set of principles as a starting point is not equal to establishing a rigid or a set way of listening. As scholars, we have 'an ethical and contractual responsibility for the development of [the] *mind*.'³⁸⁹ Scholarly discussions are scientific inquiries and must therefore be based on a body of knowledge that has been accepted as the truth, and to deny this is to deny scholarship itself. Putting a theory in place as a starting point for edification is inevitable. As the philosopher Brian Davies reminds us: 'One does not choose to live without

³⁸⁷Judith A. Jellison, 'How Can All People Continue to Be Involved in Meaningful Music Participation?', *NAfME* <<https://nafme.org/wp-content/files/2015/12/12-HowCanAllPeopleContinue-to-Be-Involved-in-Meaningful-Music-Participation-by-Judith-Jellison.pdf>> [accessed 30 June 2020], my emphases.

³⁸⁸Jellison, 'How Can All People'.

³⁸⁹Swanwick, *Music, Mind, and Education*, 123, original emphasis.

rules and their consequences, though, at times and in some degree it is possible to choose which rules to live with. To know this is to be freer than not to know it.³⁹⁰ The call for a conceptual framework in the study of music has also been made by Narmour, whom I will quote at length:

Were true hierarchical levels not a perceptual and phenomenological fact of reality, we could scarcely apprehend or understand the world of idiosyncrasy at all – musical or otherwise . . . we have strong reason to believe that the perception and comprehension of uniqueness probably depend on a few general cognitive mechanisms [and that those] psychological mechanisms must reflect universal laws of some sort . . . Thus, a cardinal advantage of creating a real hierarchical theory of music . . . is that it would allow us for the first time to deal with style-structural and idiostructural complexities on their own terms, to create a criticism based on logical argument rather than on mere opinion.³⁹¹

To theorise music, as Narmour has pointed out, is not to take away the idiosyncratic and unique properties that distinguish one piece from another, or even to take away the joy and spontaneity from listening. Naomi Cumming has argued that stylistic norms do not regulate expectations in a rigid manner, for 'only the abstract rules . . . have been mentally internalised, not the individual solutions and strategies serving the realisation of these rules.'³⁹²

Nicholas Cook writes that to associate Schenkerian analysis solely with unity 'does a disservice to Schenker. Rather, I would maintain that it is predicated on the concept of unity . . . but *about* tension, conflict, disunity.'³⁹³ In a similar way, I would argue that theory is a

³⁹⁰Brian Davies, *Social Control and Education* (London: Methuen, 1986), 7.

³⁹¹Eugene Narmour, 'Some Major Theoretical Problems Concerning the Concept of Hierarchy in the Analysis of Tonal Music'.

³⁹² Paraphrased by Neuwirth in Neuwirth, 'Surprise Without a Cause?'; Naomi Cumming, 'Analogy in Leonard B. Meyer's Theory of Musical Meaning', in *Metaphor: A Musical Dimension*, ed. by Jamie C. Kassler (Sydney: Currency Press, 1991), pp. 177–92.

³⁹³'The Future of Theory'.

framework of principles that seek to unite the 'tension, conflict [and] disunity' that manifests in phenomena of similar nature. Theory is a starting point, a necessary starting point that helps us formulate our thoughts. We do not solve a jigsaw puzzle by diving straight into the middle, but by first piecing together the frame to give us a boundary within which our imagination can take flight towards a clear objective. To have a cogent starting point and a logical outlook helps us to have clarity of thought, which in turn leads us more efficiently and constructively towards our destination.

Having the resources and know-how offers the chance for a deeper and more profound relationship with music. As Walter Riezler has put it:

What the 'analysis' of music can do for us, and what makes it valuable – even indispensable – is this, and this only: it can sharpen the ear of the unperceptive listener in such a way as to enable him to appreciate the music's organic growth; and it can therefore teach him to hear better, and so to intensify his impressions of what he hears . . . But the only way to accomplish this task is . . . to try and explain by reference to the inner laws of music.³⁹⁴

In other words, analysis offers us the opportunity to be acquainted with the inner world of this work of art and not settle for less. Riezler's call to refer 'to the inner laws of music' seems to be a reference to what we now call 'theory'. As Cook and Cope have intimated, this two-pronged approach to listening is crucial if we were to cultivate a nuanced perspective on music.

Discovering the inner mechanism of music by means of analysis does not equal the degradation of first-hand impression, given that 'intuitive knowledge itself of necessity embodies certain processes of logical ordering'. Furthermore, intuitive knowledge 'typifies most of our day-to-day realities, although by itself intuition has limitations'.³⁹⁵ This is where analysis comes in. Understanding the inner intricacies of music enables one to embark on a

³⁹⁴Walter Riezler, *Beethoven*, trans. by G. D. H. Pidcock (New York: Vienna House, 1938), 20, my emphases.

³⁹⁵Swanwick, *Musical Knowledge: Intuition, Analysis and Music Education*, 31.

more meaningful relationship with the piece in question, as well as the history that it represents. Moreover, analytical training endows us with the skills to engage in intellectual discourse about music. Without understanding what we encounter and the manner in which it came about, as well as possessing the relevant skill set to do so, we limit our capacity to discuss it in an intellectually meaningful and challenging way. In his defence of music theory and analysis, Jeff Pressing argues that the discipline allows for the elucidation of structural relations,

and the piece can be intellectually (and hopefully, perceptually [as this project has suggested]) reconstituted as a tissue of interlocking and interrelating processes and objects that make us marvel at both the composer's auditory sensibility and the analyst's cleverness.³⁹⁶

Speaking from the perspective of an educator, Swanwick advocates the use of music analysis to reinforce and enrich musical understanding:

Running alongside any system or way of working will be the ultimate question – is this really *musical*? Is there a feeling for expressive character and *a sense of structure* in what is done or said? To watch an effective music teacher at work . . . is to observe this strong sense of musical intention linked to educational purposes: skills are used for musical ends, *factual knowledge informs musical understanding*. Music history and the sociology of music are seen as accessible only through the doors and windows of particular musical encounters.³⁹⁷

A discourse naturally invokes the necessity of language. To be able to engage in a discourse meaningfully, it is taken as read that one should familiarise oneself with the vernacular that belongs to the topic of discourse.

³⁹⁶‘The Future of Theory’, *Indiana Theory Review*, 10 (1989), 65–107, 98.

³⁹⁷Keith Swanwick, *Teaching Music Musically* (London: Routledge, 1999), 45, emphases bar the first are mine.

9.3.6 Scholarly commodity?

When sharing the essence of this research to individuals outside of the field, the most common response has centred around the necessity or relevance of being able to listen to music critically. Is there any added benefit to be had from engaging with music actively, by being able to respond to its aesthetic features and underlying logic? Is there any point in having an intellectual discourse on music in the first place?

Discussing music in a scholarly context is a wildly different undertaking from discussing music in a casual setting. Scholarship entails academic rigour and a critical mindset; to question the point of understanding music critically is therefore a form of contextual misunderstanding. The tension between scholarly pursuit and utilitarian mindset has been a constant source of dispute to both musicologists and observers outside of the discipline. The idea that music possesses an aesthetic autonomy that warrants scholarly investigation has been hotly contested by Richard Taruskin, for example.³⁹⁸ In response to Julian Johnson's call to appreciate classical music as an art form,³⁹⁹ Taruskin wrote: 'Can there be any other motivation for engagement with art [outside of pleasure]?'⁴⁰⁰ To consider music for its intrinsic properties is seen as elitist and high-brow, an approach that seemingly demeans those who view music merely as entertainment. Taruskin even goes so far as to label this as a 'social snobbery [bordering] on racism'.⁴⁰¹ Another opponent to the idea of autonomy as central to musical understanding is Gary Tomlinson, who champions a contextual approach that considers cultural discourse pertinent to the music in question: 'Analysis perceive processes within the work . . . but they can assign them no meaning.'⁴⁰²

³⁹⁸ See Richard Taruskin, 'The Musical Mystique: Defending Classical Music Against Its Devotees', *The New Republic*, 22 October 2007, 34–45.

³⁹⁹ See Julian Johnson, *Who Needs Classical Music? Cultural Choice and Musical Value* (Oxford: Oxford University Press, 2011).

⁴⁰⁰ Taruskin, 'The Musical Mystique', 39.

⁴⁰¹ Taruskin, 'The Musical Mystique', 40.

⁴⁰² Gary Tomlinson, 'The Web of Culture: A Context for Musicology', *19th-Century Music*, 7.3 (1984), 350–62 <<https://doi.org/10.2307/746387>>, 360.

This duality, however, does not belong on the same plane: scholarship is meant to be intellectually rigorous, whilst entertainment is meant to be an act of leisure – they are inherently different and thus should not be compared against each other.

The rhetoric of elitism enters the debate on music precisely because music is often confused, if not downright reduced, to be a commodity for exchange instead of an artwork, i.e. the phenomenon whereby the inherent aesthetic value of an art work is usurped by its exchange value, with the latter becoming 'the means [by] which objects take on and communicate their value'.⁴⁰³ The value of music is no longer measured based on its intrinsic artistic quality but on its selling power, i.e. the widest possible audience that naturally translates to the most common stylistic preference. Based on this line of thinking, it is no wonder that critical appreciation of art is excluded from the equation, seeing as this critical appreciation, by definition, involves special skills that are not readily available. It requires effort and discernment, which are the antitheses of the mass market. To say that music is meant to be available universally, however, is to succumb to the faux democracy against which Johnson argues. 'Judgments about art and music become individual, shaped by local rather than universal criteria . . . But in the absence of shared criteria and a consequent value[,] relativism is neither equivalent to democracy nor necessarily compatible with it.'⁴⁰⁴

Art is precious because it is inherently different – 'their high degree of sophistication within a particular tradition [tends] to prevent such works from being immediately understood or enjoyed by a general public.' Art is not an instant experience but one that 'requires effort, time, and a process [that] is essentially educative.'⁴⁰⁵ Whether we like it or not, the fact remains that 'not all knowledge is of equal worth . . . There is legitimate or "quality" knowledge and there is also trivial and negative knowledge. [For example,] there is

⁴⁰³L. Green, *Music on Deaf Ears: Musical Meaning, Ideology and Education* (Manchester: Manchester University Press, 1988), 86.

⁴⁰⁴Johnson, *Who Needs Classical Music?*, 23.

⁴⁰⁵Johnson, *Who Needs Classical Music?*, 24.

doubtful value in knowing how to torture people'.⁴⁰⁶ This argument extends to music: not all music is of equal worth.

Zero-sum arguments surrounding this issue fail to see the difference between use value and artistic value. Inevitably, this results in 'the erosion of creative autonomy: increasingly, there is no protected space for the production or comprehension of art that is not profit-motivate, because the only spaces in which art can survive are commercially delimited.'⁴⁰⁷ The emphasis on use value and the commercialisation of music will naturally feed into the issue of wealth, taste and social stratification. As Marx puts it, 'A commodity . . . satisfies a particular want, and is a particular element of material wealth. But the value of a commodity measures the degree of its attraction for all other elements of material wealth, and therefore measures the social wealth of its owner.'⁴⁰⁸

By conflating use value and artistic value, we effectively shut all avenues for discourse. This is a restrictive position that will impede us from progressing 'beyond sticking a particular category label' to a piece of music, a performance of it, and the likes.⁴⁰⁹ It is perfectly possible to acknowledge the intricacies and eloquence of a book, for example, without having to claim it as one's favourite bedtime read. As Swanwick puts it, 'It is perfectly possible to understand music and still not find value, to play a Bach *Sarabande*

⁴⁰⁶Swanwick, *Musical Knowledge: Intuition, Analysis and Music Education*, 168. To this, I would also like add Eric Bredo's summary of Plato's distinction between truth (knowledge) and beliefs: 'The most fundamental distinction was between knowledge and opinion. For Plato, an opinion did not count as knowledge because it is essentially a guess, and guesses are often wrong . . . Plato concluded that only the results of a dialectical science, meaning claims that can stand up to critical discussion, in which all of the elements of an argument can be questioned publicly and demonstrated to be true, count as knowledge'; see Bredo, 'Epistemology and Education', in *Philosophy: Education*, ed. by B. Warnick, Macmillan Interdisciplinary Handbooks (USA: Macmillan, 2018)

<http://ezphost.dur.ac.uk/login?url=https://search.credoreference.com/content/entry/macuse/epistemology_and_education/0?institutionId=1856> [accessed 24 June 2020].

⁴⁰⁷Julian Horton, 'On the Musicological Necessity of Music Analysis', *Musical Quarterly*, 103 (2020), 62–104, 76.

⁴⁰⁸Karl Marx, *Capital: A Critical Analysis of Capitalist Production*, ed. by Frederick Engels, trans. by Samuel Moore and Edward Aveling (London: Lawrence and Wishart, 1954), I, 133.

⁴⁰⁹Swanwick, *Music, Mind, and Education*, 95.

quite expressively but find it quite boring [and] not think it "good".⁴¹⁰ This, of course, is quite the opposite of what Pierre Bourdieu suggests in his *Distinction*, whereby 'cultural needs are the product of upbringing and education . . . [Artistic quality therefore] corresponds [to the] social hierarchy of the consumers.'⁴¹¹ *Pace* Bourdieu, the two do not have to be conflated – in fact, it is unproductive to conflate the two, for we risk losing sight of what is actually at stake by adopting such a stance.

Measuring music using only cultural associations and appropriations effectively runs against the aims of scholarship. To say that popular classical music, such as Strauss' *Blue Danube Waltz*, is more appealing to the masses than Mahler's Eighth Symphony because the former is more recognisable and easier to process is to commit an act of value judgment that tells us nothing about the music but its utilitarian value and the preference of the commentator. Simply because *Blue Danube* is more popular than Mahler Eight does not mean that the former is inferior to the latter, or better than the latter. It is merely an expression of preference, which is subjective and arbitrary. This is contrary to one of the main aims of music scholarship, which is 'to bring music from the background into the foreground of awareness.'⁴¹² Scholarship is not at all a utilitarian pursuit. It exists for the sake of the advancement of knowledge: scholars curate, analyse, and re-analyse knowledge and historical facts, both in light of present and past circumstances, in order to gain a better understanding of the world in which we live.

This by no means belittles the sensory experience. Any study of music will always ultimately fall back on the live version; most of our encounter with the art form will be in its sounded version. 'Informal interpretations of music,' as Lawrence Kramer puts it, though 'not especially articulate, are [nevertheless] important [inasmuch as they] carry with them our

⁴¹⁰Swanwick, *Musical Knowledge: Intuition, Analysis and Music Education*, 163. Here, I will take the liberty to clarify that by 'value', Swanwick is not referring to artistic worth but to taste.

⁴¹¹Bourdieu, *Distinction*, 1.

⁴¹²Swanwick, *Teaching Music Musically*, 39.

intuitive, precritical sense of the world.⁴¹³ Judy Lochhead, too, has argued that any satisfactory 'explanation of how [music] works must lead to hearing as a category of musical understanding.'⁴¹⁴

The nature of music, however, is such that we cannot claim understanding simply by relying on the sensory. 'The meaning of a piece of music is what we understand when we understand [and hear] it as music,' so Roger Scruton once claimed.⁴¹⁵

You show your understanding not through words, but through listening, and finding yourself compelled by the musical argument . . . if all art aspires to the condition of music (as Schlegel and Pater argued) it is because music achieves the greatest possible distance from the explicit statement, while still inviting us to "enter into" its expressive content.⁴¹⁶

Scruton's argument encompasses the enigma that is music. At once familiar yet distant, music possesses many layers of knowledge outside of our immediate perception of the world. It is important to remember that while we may not normally listen to music with the aim of writing a critical essay for submission, it is legitimate and imperative to approach music critically when the time calls for it. As Swanwick puts it,

Outside formal education . . . we may rarely choose to detach ourselves from the on-going sweep of musical engagement to pick apart the layers of meaning that constitute the totality of the experience, knowing that if we do we are liable to sacrifice the integrity of musical response. But in [scholarship] it is necessary to develop an analytical framework that will help us to order our work.⁴¹⁷

Education researcher Barbara Comber states that it is the responsibility of educators to develop 'the dispositions, discursive resources and the repertoire of practice to do critical

⁴¹³Kramer, 'Musicology and Meaning', 10.

⁴¹⁴ Judy Lochhead, "'How Does It Work?': Challenges to Analytic Explanation', *Music Theory Spectrum*, 28.2 (2006), 233–54 <<https://doi.org/10.1525/mts.2006.28.2.233>>, 252.

⁴¹⁵Roger Scruton, *The Aesthetics of Music* (New York: Oxford University Press, 1997), 344.

⁴¹⁶ Scruton, *The Aesthetics of Music*, 360, 364.

⁴¹⁷Swanwick, *Musical Knowledge: Intuition, Analysis and Music Education*, 160.

[thinking] work'.⁴¹⁸ This includes, as Hilary Janks proposes, cultivating the ability to 'make connections between something that is going on in the world and in [our daily] lives'.⁴¹⁹

Ultimately, such a training aims to produce thinkers capable of making '*logical and nuanced connections between something that is going in the world and in [their] lives, to be able to distinguish facts from hidden agenda, for only in this way can they* explore how the problematic is instantiated in texts and practices by a careful examination of design choices and people's and therefore imagine possibilities for making a positive difference'.⁴²⁰

As a framework for understanding, theory and analysis offers a methodical starting point that encourages scientific observation and assessment of music. Such an approach considerably counteracts the ambiguous ontological issues surrounding the art form, which enables us to study it in as objective a manner as possible. That said, this does not completely obliterate the artistic element, the subjective response that makes art what it is. As Phaedrus describes in *Zen and the Art of Motorcycle Maintenance*: 'A classical understanding sees the world primarily as underlying form itself. A romantic understanding sees it primarily in terms of immediate appearance.' The argument further evolves: 'The romantic mode is primarily inspirational, imaginative, creative, intuitive. The classic mode, by contrast, proceeds by reason and by laws – which are themselves underlying forms of thought and behaviour'.⁴²¹ Whilst theory attends to the classic mode, analysis concerns itself with the application of the classic in combination with the romantic; in short, theory and analysis form a two-edged sword that allows us to look at music both objectively and subjectively, capturing the technical elements of the music themselves as well as our responses to them.

⁴¹⁸Barbara Comber, 'Critical Literacy Educators at Work', in *The Practical Critical Educator*, ed. by Karyn Cooper and Robert White (Dordrecht: Springer Netherlands, 2006), pp. 51–65 <https://doi.org/10.1007/1-4020-4473-9_4>, 51.

⁴¹⁹Hilary Janks, 'Critical Literacy's Ongoing Importance for Education', *Journal of Adolescent & Adult Literacy*, 57.5 (2014), 349–56, 350.

⁴²⁰Janks, 'Critical Literacy's Ongoing Importance for Education', 350, my addition in italics.

⁴²¹Pirsig, *Zen and the Art of Motorcycle Maintenance*, 66.

9.4 Looking to the future

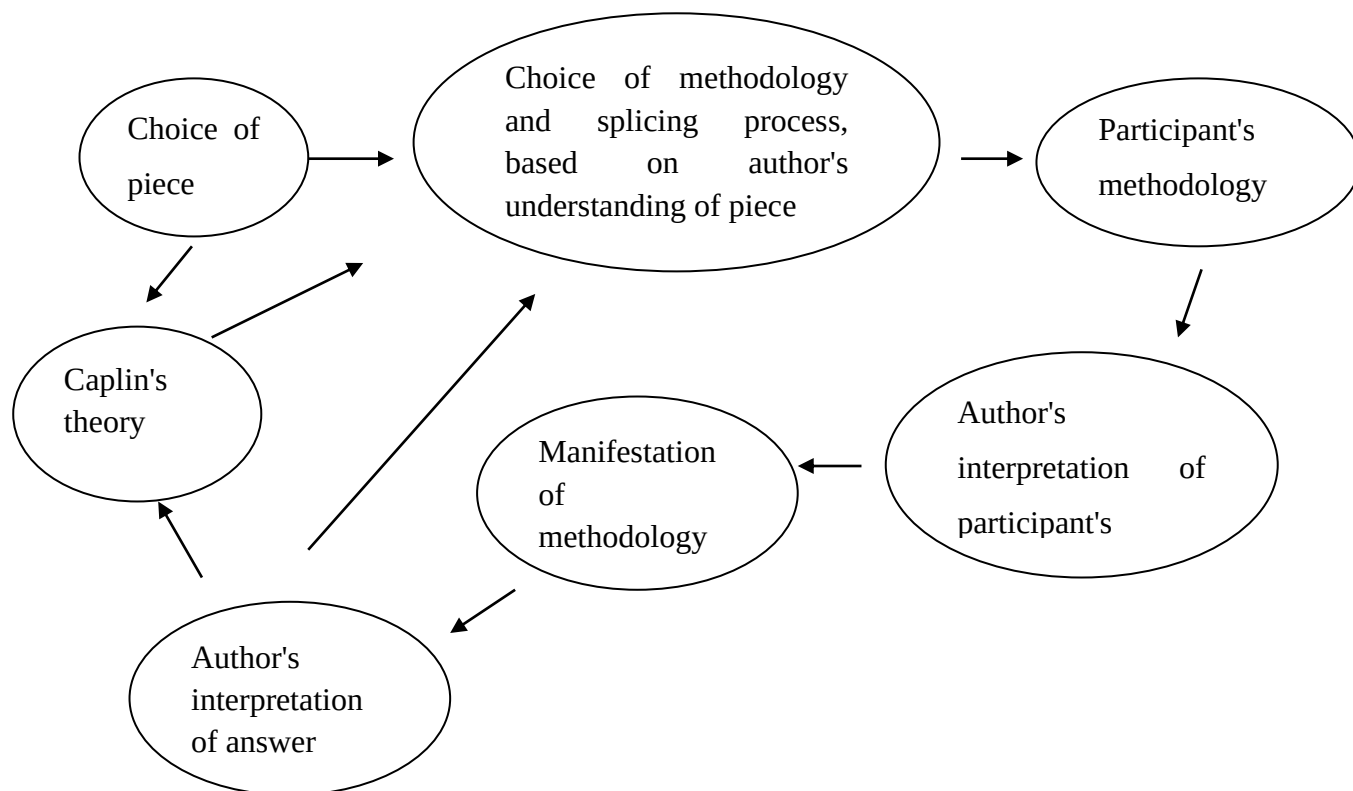
9.4.1 Appraisal of the project

Despite the author's best intentions and efforts, this project exhibits plenty of shortcomings, some of which are more obvious than others.

From the outset, this project aims to investigate the possibility of bridging the various knowledge gaps that exist between music theory and analysis, and music psychology. To remedy the main weaknesses of existing cognitive scholarship to date – lack of (current) theoretical underpinning being one of the main issues to tackle – I took a contemporary theory of musical syntax as the basis of the empirical study. As has been previously mentioned in Chapter 1, investigating music cognition based on a specific set of guidelines that have been immortalised as a body of theory is advantageous as it means researchers do not simply rely on the individualistic nature of each participant recruited. In other words, there is a solid, immutable variable that standardises the study.

Despite being marketed as a theory-driven study, there is no denying that this study ultimately relies heavily on the inner workings of 37 highly unique brains that cannot submit to any generalised theoretical explanation. The answers collected may display trends and common mistakes were made, and indeed, these support the legitimacy of analytical and empirical observations to date in the fields concerned. That said, we must bear in mind that within each answer lies countless considerations governed by a cognitive network that is arguably impossible to be decoded fully.

Firstly, the interpretations provided for each functional interpretation and misinterpretation in this chapter, i.e. the thought process that influences data interpretation, consist of the following:



The multi-step process outlined above does not, by any means, capture the full richness that surrounds the ways in which the music was and is experienced by the composer, the analyst and interpreter, and the experimental subjects. Furthermore, it must also be noted that the processes above are in fact a circular set of steps – it is incredibly difficult, if not impossible, to disentangle each from the other. The last item on the list feeds into the first, and so the cycle continues.

Naturally, this leads to the next critique, which was initially posed by a colleague in Amsterdam during Beethoven 2020 Conference: is it even justified to analyse musical perception in this way – that is, using segmentation and reconstruction – as it is unintuitive and deconstructive? If we have to choose two adjectives that are antithetical to Classical music, 'unintuitive' and 'deconstructive' are perhaps very strong contenders. My response would be that despite our best efforts, music perception naturally presupposes ambiguity and subjectivity. As a field that strives to eliminate such qualities, empirical research inevitably

has to sterilise music to a certain extent. From the perspective of music analysts, this understandably raises questions. I would argue, however, that this dilemma is here to stay, for there is no way of cleanly separating the subjective and objective in music. We will always fall short of perfection, which only serves to highlight the fascinating nature of the field.

Another criticism was posed by a reviewer on the EuroMAC-10 panel who vetted an abridged version of this thesis:

The proposal is more perception training oriented than musically analytical. Also, it constraints itself to works of the classical period, which may put into question the validity of any generalization on formal and structural recognition in less cultural specific repertoire and musical language.⁴²²

The driving force behind this project was the desire to investigate the audibility of Caplin's form-functional claims in the repertoire with which he has mostly concerned himself, i.e. the Classical works by Mozart, Beethoven and Haydn, on whose works he has largely derived his theoretical observations. Under no circumstances have I ever claimed to be concerned with developing a general theory on formal and structural recognition. I have also been very conscious of the cultural specificity of this project and have never denied the constraints it inevitably poses. The research question has always been incredibly specific, and any conclusion extrapolated from the findings and their analyses are thus most likely valid only within the realms of the Classical repertoire as viewed from the Caplinian lens.

The results discussion in this chapter has brought to light the importance of logical thinking and conceptual understanding. I argue that the results and trends discussed earlier have much to inform the way we teach and study music, and highlight the timely issue that is the importance of music literacy, critical thinking and logic in music-making from a young age. In the previous paragraph, I stressed that any argument and conclusion extrapolated from

⁴²²EuroMAC Committee, 'EuroMAC-10 Notification for Paper 22', 2 April 2020.

the findings would only be valid within the realms of Classical music when viewed from a Caplinian lens. Under the education sub-section in the next chapter, however, I am all too aware of the possibility of being criticised for seemingly contradicting myself: having claimed that I do not intend, nor will I be able to, generalise and prescribe a way of thinking about Classical music, how could I make suggestions for the future of music education based on my findings in this study? Although the details will not be covered here, I will try to illustrate the difference using the following scenarios:

Inasmuch as findings from this research strongly suggest the importance of thinking in a formally logical and systematic way, human beings should aim to learn and incorporate this listening skill with a view to enriching their musical engagement;
and

Inasmuch as findings from this research strongly suggest the importance of thinking in a formally logical and systematic way, music educators should aim to instil these valuable critical-thinking abilities in their charges with a view to equipping them with lifelong transferrable skills.

The first confers value judgement on the activity of music-making, and it is laden with assumptions as to what kind of music is considered superior by virtue of its ability to nurture the intellectual faculty of men. On the other hand, the second statement proposes a way by which we may educate the future generation using a particular school of thought as a guide, simply because a curriculum requires a model and the school of thought in question has been widely researched over the years and thus is well-documented for educational purposes – it does not in any way suggest an attempt to indoctrinate or inculcate a specific set

of cultural values, which, considering the current political climate, is anachronistic and can be easily taken out of context.⁴²³

Another potentially obvious criticism is that I have played too heavy-handed a role in results analysis by interpreting the body of results collected. I make no excuses and I acknowledge that my personal preferences and musicality are present in the results analysis, as well as the musical analyses that shaped the way the puzzles were constructed and ultimately, the way candidates perceived them. No analytical study is ever free of the analyst's personality and tastes, but the same does not always apply to empirical studies, which for the most part relies on hard facts gathered from observation.

Nevertheless, I have strived to remain as logical as possible in deciphering answers, especially those that seem functionally contradictory in ways that are not pre-empted within theoretical principles. An example of such a case can be found in NM9's Haydn answer, where the following sequence is observed:

Table 88 NM9 Haydn reconstruction

Clip	Sonata space	Description
17	Recapitulation	TR MC
14	Exposition	Closing
4	Recapitulation	MC ESC
18	Exposition	TR
9		Response: V
8		Opening
12	Development	Seq 1
21		ReTR
16	Recapitulation	Closing
10	Exposition	MC EEC
11	Recapitulation	Reprise of statement

⁴²³ The bipartite structure of this sentence alone shows how the two halves are different by nature: the second assumes the presence of an ideological stance, whereas the first merely poses the need for an educational model – the necessity for an educational model is a fact, not propaganda.

The highlighted segments are of interest. TR MC is a continuatory function, whereas MC ESC and MC EEC belong to the cadential family. Yet the fact remains that each of the three starts like an initiation, with a thematic statement that is not seen through to the end. This ambiguity seems to have influenced NM9's reconstruction: more so than the TR MC, the ESC and EEC can be seen either as pre-initiation gestures, or self-sufficient units by themselves inasmuch as they start like an initiation and fleetingly resemble a continuation before finishing as a proper cadence. This type of ambiguous answer is very common, especially among NMs, and proved to be very challenging to be analysed and categorised, seeing as they do not easily fit into a single functional use. In the process of tabulating and analysing data, areas affected included determining chain lengths and functional misinterpretation. Although it is clear that these clips are what they are from a theoretical perspective, their real nature is obscured from the way they have been slotted together in this answer. In fact, this is applicable to all clips concerned in this experiment.

When analysing such a case, I have often had to revert to basing my judgment on a model of code of best practice: recognising that each circumstance is different and has to be taken on its own merit, despite having a set of guidelines as a starting point. For example, I have decided to consider the EEC and ESC as stand-alone features in this particular context. Finding out the real motive behind a clip's placement is not possible, which therefore means that I have had to second-guess and make an informed guess. For all we know, NM 9 could have been treating the EEC and ESC as pre-initiation function, or poscadential in the case of the ESC.

Although this approach may sound counter-intuitive to the general instinct in academia, I would like to contend that this is one of the unique points of this study that differentiates it from cognitive approaches of the past. This study is a fascinating blend of the objective and the subjective, and reveals that there is no one correct way of listening to

music. Of course, there are theoretically correct ways of doing so, and they are reflected in those answers marked as sequentially and/or functionally accurate. All too often, however, we process music by following multiple parallel tracks, and this is perhaps manifest in the various alternatives through which we can interpret the answers in this puzzle experiment.

It is worth bearing in mind, however, that this study does not aim to investigate methods used in listening to music. This is incidental to the main purpose of the research: to find out whether musical syntax in the Classical repertoire is audible to participants from all walks of expertise.

The Haydn answer in the previous paragraph has illustrated a further point for complication in this experiment: the extremely challenging endeavour that is identifying the precise reasoning behind a candidate's decision to place a clip in a particular location. In the sub-section on 'pile-ups,' I mentioned that the presence of an excessively continuatory phrase, for example, can point not only to the clips in question being ambiguous, but also to the possibility of genuine misinterpretation by the candidate. In other words, it is not because the music was functionally ambiguous that such an answer was borne – it is because the candidate truly believed that the music had to be crafted in that way. A possible solution to this conundrum could be to monitor candidates more closely in future experiments of this kind, or conduct a post-experimental interview where candidates are asked to justify their answers, step-by-step. This is, of course, an extremely laborious undertaking that requires a robust reward system to be installed as compensation.

It is also because of those reasons that algorithmic calculations proved unviable. Edit distance calculation was initially planned to be one of the main standards against which results would be measured. Following initial implementation, however, it became very clear that programmes available would not be able to capture musical nuances such as thematic repetitions in a systematic and fair manner. By way of illustration: Clips 8, 11, 24 and 25 in

the Beethoven are interchangeable inasmuch as they all contain the same rondo statement, but we discovered that no algorithm could represent this interchangeability without impacting the score in a lopsided manner.

As a result, results calculations have had to be based on simple probabilistic calculations that are dependent on manual interpretation of each clip on multiple levels: neighbouring clips, sectional, and overall. The probabilities cited in this chapter are not at all representative of general conditions, but restricted to the confines of this study. Having said that, this is not necessarily a problem considering that the main focus of the project is scrutinising trends, if any, of functional understanding.

These trends and values relating to them are related to the number of participants involved in the study: the small pool of participants, especially in the F category, is definitely in need of improvement should there be a further study of this kind. It was especially difficult to recruit third-year analysts who not only had to focus on their final-year performance, but also extra-curricular commitments. The two made for a very unforgiving schedule that understandably deterred many from participating, or seeing their commitment through. Moreover, the lack of substantial financial reward – especially in light of the considerable time commitment required in doing the puzzles – did not prove tantalising. The very specific criteria for recruitment I have set out meant that recruiting from other universities was off-limits: the students had to be those enrolled under a Caplin-oriented analytical course, and as far as I am aware, no other Music department in the country administers such a programme.

Although I strived to choose pieces that are not overplayed (in the sense that they do not have the 'star' status that Mozart's K. 331 has, for example), there were inevitably a few candidates who were familiar with some, if not all of them. This does not immediately invalidate their answers, for as we have seen, familiarity guarantees neither functional nor sequential accuracy. Familiarity itself is a concept that is multifaceted – there is no 'one size

fits all' meaning to the concept that describes the level to which we are acquainted with something.

In the case of music, and in particular this set of puzzle studies, this differentiation is even more pertinent. By comparing and analysing results and methodological reflections, I can conclude that there are three types of familiarity observed in this study. Firstly, there are those who indicated familiarity and demonstrated this in their answers, which were for the most part accurate and logical, form-wise. The second type consists of participants who stated that they were only acquainted with the opening line through their practice, classroom assignment or from listening casually to a Youtube classical playlist when studying.

Evidently, this type of familiarity does not in any way point towards a kind of knowing that is critically informed. I may have read *To Kill a Mockingbird*, which therefore entitles me to place a claim of knowing the story, but that does not necessarily translate to my having a critical understanding of it.⁴²⁴

That said, why have those candidates been placed under the 'familiar with X piece' category? Although this type of familiarity is fleeting and partial, it still imparts a certain degree of memory assistance, so to speak, when reconstructing the puzzles. For example, being familiar with the opening melody in the Beethoven puts a participant at an advantage, predominantly by eliminating the ambiguity surrounding the statuses of P- and S-themes. Knowing that P-theme is the first thing that appears on a recording of this sonata effectively removes one mental hurdle already. Should the participant also be aware of the manner in which said theme recurs, he would also have gained a significant head start in configuring the formal design of his reconstruction.

The third and final type of familiarity in this project is embodied in one candidate: S

10. Her concept of familiarity is akin to that found in the second type above, i.e. partial. Very

⁴²⁴ See, for example, R. S. Downie, 'Knowing and Understanding', *Mind*, 71.282 (1962), 237–40; John Stiles, 'Knowing versus Understanding: Teaching That Goes beyond Trivialities', *Iowa Science Teachers Journal*, 33.2 (2006), 3–7.

uniquely, however, she managed to become the only participant to have submitted three perfect answers. S 10 admitted to have been interested in the concept of musical syntax and undertaken self-study on the subject even before starting to read Music at university. It is reasonable to conclude that her interest and initiative, combined with her high-level of intellect as demonstrated in her classroom performance, contributed to her outstanding performance in this study.

In the experimental design, I stated that the pre-task listening exercise was meant 'to equalise the playing field, so to speak, i.e. to impress, *however fleetingly*, the style being tested in the minds of expert and non-expert participants alike.' In other words, this served as the control variable. I have emphasised the notion of fleeting impression because it has been revealed to be a very tenuous element in this set-up, particularly for the NM group. Such an attempt to equalise the field would have perhaps been effective, to a certain extent, when applied to those with prior knowledge of the style. Stylistic awareness, or more colloquially, a feel for the music, is a trait that would normally be acquired following an extended period of regular exposure: it is highly unlikely that one can gain stylistic awareness from a single audio track lasting four minutes. Matters would be further complicated for NM-participants, for without the right body of knowledge, one would not be cognisant of the landmarks to which he was supposed to pay attention. Nevertheless, the empirical set-up of this PhD study meant that there was a need to equalise the starting point for every candidate involved.

Attempting to equalise using a Mozartean sonata is also another thorny issue. Earlier, I argued that syntactical understanding seems to be Mozartean, based on results collected. Participants were asked to note stylistic points from the Mozartean specimen in the listening exercise and use them as a set of guidelines to reconstruct the three puzzles. If there had been participants who were in fact able to note, select and implement these stylistic guidelines in their working, their results would have been inadvertently skewed towards a Mozartean style.

Of course, this would be true only on the assumption that such participants were completely not aware of the fact that each puzzle displays a different style. If these conditions are fulfilled, my argument on the tendency to adopt a Mozartean understanding would largely be invalidated: it is not through education that this is the case, but a single round of listening exercise. That said, we have also established that the latter is highly improbable. The likeliest conclusion to draw from these points, then, is perhaps that there is no real way of determining the exact point or source on which we base our musical understanding.

In the context of this experiment, the concept of time limit is a double-edged sword. On one hand, giving participants a rough idea as to how much commitment is expected from them is a form of incentive in itself – this is especially relevant if they are not getting (significant) financial rewards for their time and effort. On the other hand, imposing a time limit on this study would have been an added form of pressure: this is an intellectually demanding set of three tasks, which, as we have seen, has the potential to affect the self-esteem of those who consider themselves to be musically committed, such as Music students. There have been cases where recruits decided not to see this experiment through because a glance at the tasks made them feel inadequate as an analyst: 'I don't think my skills as an analyst are good enough to solve these puzzles, and I don't want to give you bad results that will affect your PhD negatively.'⁴²⁵

This study perhaps could have benefited from being incorporated into the curriculum as a form of formative assignment or an informal class exercise. Transforming this into a formal requirement for students would have strengthened the recruitment profile by a great margin. Although this idea was considered, it was by then too late to start the process of reviewing the material and submitting it to the Board of Studies for approval.

⁴²⁵Anonymous, 'Discontinuing with Experiment', November 2019.

9.4.2 Suggestions for future research

An area worth investigating in greater depth is the perceptibility of the hierarchical nature of PAC. Caplin himself has advocated for 'a more precise and focused conception of cadence [that] will have the heuristic value of sharpening our listening experience and encouraging us to make more subtle distinctions among a wide variety of harmonic, rhythmic, and formal phenomena.' Results from this experiment suggest that listeners are only able to distinguish cadential function for what it is – most candidates could recognise cadential function, and not initiation or continuation, as an ending function. The multiple layers under this terminological umbrella, however, are not obvious. As Caplin has cautioned, 'confusing cadential content and function has led to problematic analyses of cadence, which, in turn, can lead to problematic interpretations of phrase structure and form.'⁴²⁶ It is perhaps also worth investigating the nature of the postcadential and the ways in which it distinguishes itself from initiation and continuation functions, seeing as the postcadential was misread frequently as such in the present study.

Future research of this nature should also consider post-experimental follow-up exercise. Such an exercise could potentially help to mitigate the various ambiguities that were encountered in the process of analysing results from such a qualitative experiment. Elements to consider would include comparing methodological approach and submission and ascertaining functional understanding. This would be particularly useful when trying to decode, for example, cases such as multiple PACs: does it stem from a lack of awareness surrounding a typical cadential event, or does it stem from a genuine belief in such a procedure?

A possible set-up for a follow-up exercise could take the format of an interview. Questions posed could include the following:

⁴²⁶Caplin, 'The Classical Cadence: Conceptions and Misconceptions', 52, 82.

- Could you run us through the process you went through to solve this puzzle?
- What made you decide to take such a strategy?
- How certain were you with your final product?
- Could you tell me more about why you placed [a functional anomaly] here?

Following the questions, a final step could be to play a selection of clips taken from other Classical sonatas not used in the puzzle and ask whether candidates recognised these as beginning, middle, or end, and why. This would act as a confirmation of the answers they provide in the experiment and follow-up procedure, thus serving to eliminate ambiguity to a certain extent.

Implementing a feedback system in tandem with a shorter task set-up could possibly address the ambiguity surrounding completion time as raised in Chapter 3. Section 3.3.5 covered instances whereby some candidates took less time to complete the Beethoven puzzle than they did the Mozart despite the fact that the former was formally more complicated. By modifying the task in terms of length and format, the possibility of narrowing the room for ambiguities in this case might arise, i.e. we would stand a greater chance to discover whether candidates find Beethovenian syntax easier than Mozartean, or vice versa.

Another alternative is to manipulate the existing musical parameters in this study, such as using Sibelius to play the sonatas instead of live recordings, using different instrumental timbres for different sections, or transposing certain sections. Yet another plausible experimental set-up is to hold another round of puzzle study, which contains another Classical sonata by a less-well known composer, such as C. P. E. Bach. Not only will this investigate the perceptibility of formal functions further, it will also help us understand whether the works of non-canonical composers are as amenable to the ear as those of the Holy Trinity in this study, thus allowing us to an insight into the wider legacy and reception history of Classical composers.

The demographic groups involved in this study are rather restricted inasmuch as I wanted to focus on the comparison between those with and without understanding of Caplinian principles. Whilst this strategy enables a clear starting point, it might be worth expanding the pool of participants to include a more varied background to obtain a more nuanced picture of form-functional understanding, especially given the argument I presented earlier regarding the subconscious presence of form-functional understanding in our cognitive system. In other words, if something resembling form-functional understanding, however primitive, supposedly exists in our musical cognitive system, it would be possible to see a manifestation of it in other Music students, regardless of the pedagogical school they follow. We could also expand the age range to include younger and older population, which would enable age-based comparison.

9.4.3 Contradictory completion time

The analytical module that is offered to S candidates at Durham focuses heavily on Classical syntax. In this module, candidates are encouraged to immerse themselves in musical forms and formal practices prevalent between the times of Bach and early Beethoven. Their analytical sound world, therefore, has been largely conditioned to follow the Classical conventions, at least within the confines of academia. Their mean scores suggest that they found the Mozart puzzle to be more straightforward than the Beethoven, which, bearing in mind their learning conditions thus far, is not at all surprising: they were more used to interacting with Mozartean language than middle-period Beethoven.

On the other hand, F- and NM-candidates took shorter times to solve the Beethoven than they did the Mozart. A likely explanation could be that they had simply chosen not to invest as much time as they did in the first instance, especially considering that this involvement promised no financial reward and bore no direct correlation to their life; another explanation is that upon realising that Puzzle 2 was 'more challenging [due to it being]

syntactically less predictable,⁴²⁷ participants decided not to go out of their way to solve it since the result would likely never be satisfactory.

9.5 Conclusion

Combining empirical approach, music theory and analysis, the present study presents a unique perspective into the world of music cognition. Human beings are not only capable of associating cadence with musical ending, or differentiating between aesthetic levels in various excerpts and their foils, but also recognise formal functions that were first devised as a body of theory. Humans can recognise musical syntax, and conversely, music theory is not limited to a flat existence on paper.

The three-pronged methodology helps eliminate some of the main concerns that have impeded cognitive studies to date by addressing analytical assumptions, outdated definition and understanding, and providing a listening environment that has no preliminary set-up that may interfere with results collection (such as a fill-in-the-blank exercise with the first clip given). One of the most significant findings from the present study is the fact that listeners can identify initial tonic among other harmonic shades without any aid but their aural capacity. This is not limited to trained musicians, but also those who have never received formal instruction in music, be it practical or theoretical.

This also highlights the relevance and value of theory and analysis in musical understanding. As a discipline, they direct and ground our attention to the nuts and bolts of music themselves. Our observations and responses therefore go beyond the sensory and subjective to include the objective. The scientific foundation of theory and analysis also enables music to be subjected to the principle of falsification, thereby offsetting – to some extent – the intangibility of the art form.

⁴²⁷F1.

In *Homo Deus*, Harari argues that dataism promises scholars and intellectuals the 'holy grail that has eluded us for centuries: a single overarching theory that unifies all scientific disciplines from musicology through economics to biology.' According to dataists, 'organisms are algorithms, and that giraffes, tomatoes and human beings are just different methods for processing data.'⁴²⁸ In this sense, the way we perceive music is in reality nothing to do with individualistic notions such as preference or emotional ties; rather, it is merely the way homo sapiens is wired to process the algorithm that is music: 'Music, according to this view, is mathematical patterns . . . The experiences they create in humans . . . don't really matter.' This approach pays absolutely no heed to humanistic tendencies to emote, nor does it allow for the fact that music is by all accounts an inexplicably esoteric-yet-personal phenomenon. Music is not just a set of patterns, but a set of patterns capable of touching our brains and hearts in the most profound ways. Is it really nothing but data?

This, in fact, was one of the most pertinent feedback I have received to date. 'Do we lose the music itself by chopping it into however many snippets? Do we end up analysing people's reaction to the piece, or the individual clips, which do not make sense on their own anyway?'⁴²⁹ Similarly, Harari states that dataism 'undermines our primary source of authority and meaning [by] eradicating the human experience with data patterns'.⁴³⁰ It would be remiss only to attempt to defend the importance of individual musical data for its own sake, but I would still argue that each clip has something to share regardless. In *After Dark*, Haruki Murakami describes early-morning commuting as such: 'Each of those under transport is a human being with a different face and mind, and at the same time each is a nameless part of

⁴²⁸Harari, *Homo Deus*, 428-29.

⁴²⁹ A question posed by audience at the end of my presentation in Beethoven 2020 conference in Amsterdam; the paper is Laura Erel, 'The Ironic Sonata: How Musical Puzzles Investigate Composer-Listener Interaction in the First Movement of Op. 31 No. 1' (presented at the Beethoven 2020: Analytical and Performance Perspectives, Amsterdam, 2020).

⁴³⁰Harari.

the collective entity. Each is simultaneously a self-contained whole and a mere part.⁴³¹ Seen from a micro perspective, each musical clip in this experiment is akin to Murakami's individual commuter – each has its own personality and means something. On its own, however, it offers only a sliver of the larger picture we are seeking: in *After Dark*, it is the bustling, city-wide phenomenon that is early rush hour; in this experiment, it is the multi-level understanding of music. I am saying that there is value in both micro- and macro-level perspectives, just like how the ocean can be appreciated from the surface by beach-goers, as well as down under by divers and marine researchers.

Yet there is a missing piece to the great network of algorithms glorified by Dataism, namely the origin of these algorithms. This has remained a mystery in Dataism, and proponents of the movement have argued that just as how believers cannot fathom the true nature of God's existence or His plans, 'the human brain cannot fathom the new master algorithms . . . The seed algorithm may initially be developed by humans, but as it grows it follows its own path, going where no human has gone before – and where no human can follow.'⁴³² A similar thought process can be applied to Classical syntax, composition and composer: the seed algorithm – a new way of composing, such as Beethoven's 'new path' or Haydn's eclectic use of TR rhetoric in S-theme – was initially pioneered by a composer, but as it grew it followed its own path, being developed and permuted into a myriad of variations by others, eventually creating a network of conventions that we now call the Classical syntax – each practice, each composition, each syntactical example is ever so slightly different, yet we can recognise them as originating in one root that is the Classical style.

This, however, is not the end of the story, for a piece of music is much more than just the sum of its components. Perhaps this statement immediately rings true for the average

⁴³¹Haruki Murakami, *After Dark*, trans. by Jay Rubin (London: Harvill Secker, 2007).

⁴³²Harari.

listener who is not privy to the technical world of music analysis, but the same principle also applies to music scholars: no analysis could be carried out without aural aid – pen and paper could only do so much without the ear. We should understand the artefact with which we interact in order to experience a deeper and more meaningful engagement with it, whilst also bearing in mind that some elements in music will likely remain an individual mystery that is unique to every listener.⁴³³

Understanding the intricacies of an artefact allows us to appreciate it at a higher level. Ultimately, however, we must also acknowledge that these technical tools are only a means to an end – they are not the music itself, but a set of methods that will help us grasp the full extent of this profound aural mystery. The master of the network may never be known to mankind, but by recognising and attempting to comprehend the system, we may just be one step closer to it.

⁴³³ 'Ultimately, of course, the principles governing closure and nonclosure [, to name but two,] can only be discovered in the perceptions, cognitions, and learning habits of the music listener.' In short, there remains an element of subjectivity in every musical experiment that is inaccessible to theory. See Narmour, 'Some Major Theoretical Problems', 156.

Appendix 1: Experiment Information Sheet

Formally Puzzling Musical Puzzle

Information about this study

This study forms a part of a PhD project undertaken by Laura Erel, which investigates the perceptibility of Classical formal theories in real-time listening process. The musical puzzle experiment will consist of three components: a pre-task listening session; the puzzle tasks; and a post-experiment questionnaire.

This is a take-home exercise with no time limit, although you are advised not to spend more than 45 minutes on each puzzle.

The purpose of this study

Although many cognitive experiments have been carried out to investigate awareness of musical features such as structure and harmony, none has approached the issue from a theory-specific angle. Consequently, existing studies have often failed to address fundamental issues relating to musical perception in real-time hearing, such as tonic recognition. This PhD project aims to test the level of structural awareness in real-time listening using repertoire-specific formal theories.

What does this study entail?

This experiment consists of three stages:

1. Pre-task listening session: you will be listening to the first movement from Mozart's K. 280.
2. The puzzle task: you will be asked to reconstruct three puzzles by rearranging the clips to make what you think is the most logical order.
3. After completing the puzzles, copying and pasting your answers, please fill out the short survey included in the Google Form.

Why have I been approached?

This PhD project aims to work with results collected from first- and third-year Music undergraduates studying Music Analysis, as well as an equal-sized group of individuals aged 18 and above with no formal training in Theory and Analysis.

Participation and confidentiality

Participation is voluntary and you can opt out before or during the experiment. All data included in the thesis will be anonymous. If you would like a personalised results feedback, however, please request for one. ***This exercise does not have any bearing on your module performance AND IS NOT AN ASSESSMENT.*** Personalised feedback will be given around six weeks after your participation. I will also be circulating a group performance statistic. By participating in this experiment, you consent to your results being analysed and included as part of a PhD thesis, and potentially shared with other researchers for future studies.

What are the benefits of participating?

This study will investigate whether music analysis is directly relevant to real-time musical experience. That aside, this is also a light-hearted, game-like opportunity for you to put your knowledge into practice.

What are the risks?

There are no known risks related to this study.

Contact information

If you have any question or concern relating to this study, please contact

PhD Student

Laura Erel (laura.erel@durham.ac.uk)

Supervisors

Prof. Julian Horton (julian.horton@durham.ac.uk)

Prof. Tuomas Eerola (tuomas.eerola@durham.ac.uk)

Technical requirements

As music tracks will be played throughout the survey, please ensure that your computer sound system is not muted. Please ensure that the volume is not too loud, to prevent any hearing damage. Please also ensure that you use Google Chrome as your browser as this is the most compatible platform on which to run the interactive website.

Providing your consent

I confirm that

- I am 18 years of age or older;
- I have read the above information;
- I understand that my participation is voluntary and that I am free to withdraw at any time without giving any reason;
- I agree to take part in this study;
- I consent to any data I submit being stored and used for academic research;
- I understand the conditions of this study.

Signature:

Name:

Email:

Appendix 2: Answer Sheet (first version)

Puzzle 1

1. Listen to <https://www.youtube.com/watch?v=RyEAYVGFvIo>, paying particular attention to style.
2. Then go to <https://soundcloud.com/search/sets?q=laura%20erel>.
3. Based on the stylistic cues you've picked up from K. 280, reorder the 33 clips underneath the playlist 'Puzzle 1' to make what you think is the most coherent whole.

There is no time limit, but please record the time you take to complete the puzzle in the space provided.

Please record your answer in the boxes below along with confidence rating (on a scale of 1 to 5, 1 being least confident and 5 very confident) in bracket, e.g. 32 (3); 1 (1); 25 (5), etc.

Time taken to complete puzzle:

Are you familiar with this piece (please delete accordingly): yes/no

Do you have (please delete accordingly): absolute pitch/relative pitch

In your own words, briefly describe how you went about solving this puzzle (any strategy employed, for example):

Post-experiment questionnaire

Gender: M/F

Age:

Number of years of musical training:

Instruments played:

Genres preferred (please indicate all that applies with an X
in the next column)

Classical

Heavy metal

Hip hop

Gothic

Rock

Jazz

Gospel

Soul/R & B

Trance/techno

Appendix 3: Demographic Data for NM Participants

	NM 1	NM 2	NM 3	NM 4	NM 5	NM 6
Gender	F	F	M	F	M	F
Age	24	24	26	24	26	19
Strategy	I had a piece of paper with me and I ticked the numbers that I've arranged. I grouped them into categories that I think sound like the beginning, middle and the end. I also grouped numbers that sound similar.	I grouped together the ones that sounded like they were in the same style – and then sequenced the patterns (e.g. two major patterns, followed by one minor pattern)	I tried to have it slow at the beginning and then picking up pace throughout before slowing down at the end. No clue really.	I listened to the clips and tried to group them based on speed, pitch, whether the notes were generally going up or going down, whether it was a melody, whether it was major or minor, and whether there was a rit. Then I tried to place similar clips either next to each other or separated by runs/contrasting clips.	Pace and volume to determine.	I categorised the pieces based on the key they were played in. I started off looking for the ending piece and seeing which key it is played in so I can find the beginning from the corresponding key category.
Training	3	12	NA	8	3	13
Instrument	Viola	Recorder, flute, piano	NA	Flute and voice	Saxophone	Piano and guitar
Time A	360	70	17	145	26	120
Time B		25	15	105	25	120
Time C			25	67	35	60
Accuracy A	6.25	34.4	12.5	15.6		78.1
Accuracy B		19.4	6.45	9.68		38.7
Accuracy C			10	5	15	25
Score A	96.9	68.8	56.3	84.4	62.5	84.4
Score B		67.7	64.5	54.8	54.8	67.7
Score C			85	25	65	85
FNMA A	31.3	46.9	59.4	50	37.5	9.34
FNMA B		41.9	54.8	48.4	48.4	38.7
FNMA C			35	60	35	45
UE A		x	x			
UE B						
UE C				x	x	x
Familiarity A						x
Familiarity B						
Familiarity C						
RP	x	x	x	x		x
AP					x	
Classical	x	x		x		
Heavy metal						
Hip hop	x	x				x
Gothic						
Rock			x			
Jazz					x	x
Gospel	x					
Soul/R&B				x		
Trance/techno						

	NM 7	NM 8	NM 9	NM 10	NM 11	NM 12
Gender	F	M	F	M	F	F
Age	20	25	22	19	20	23
Strategy	Find the beginning and the end of the song and guess the others.	Tried to identify puzzle pieces with the same note pattern; attempted to link the last note of one piece to the starting note of the next piece (including the similarity/difference in the pitch).	Tried to identify phrases, tried to identify parts of the piece (fast -> slow -> fast) and then match the phrases to these. When that semi-failed, tried to match ending and starting notes of each puzzle pieces. And then I cry.	I tried to connect the musical puzzle with the closest rhythm and location of the notes at the piano. e.g. C is close to D.	By the loudness and notes.	Puzzle 1 - sometimes trying to work backwards, or trying to remember an excerpt and playing multiple ones to see if they fit. Puzzle 2 - I know the piece quite well, so I was just trying to remember each passage and put them together in the right order.
Training	7	NA	10	10	5	14
Instrument	Violin	NA	Piano	Piano	Piano, flute, guitar, violin	Piano and violin
Time A	180	150	270	55	60	60
Time B	60	30	45	60	60	70
Time C	43	50	90	45	50	50
Accuracy A	9.34	15.6	15.6	34.4	9.38	28.1
Accuracy B	16.1	6.45	9.68	19.4		83.9
Accuracy C	10	5	10	20	10	15
Score A	78.1	75	62.5	90.6	81.3	78.1
Score B	61.3	45.2	48.4	87.1	90.3	93.5
Score C	80	15	35	75	70	75
FNMA A	40.6	43.8	40.6	34.4	46.9	43.8
FNMA B	45.2	45.2	41.9	38.7	41.9	16.1
FNMA C	55	50	40	60	35	50
UE A		x	x			
UE B						
UE C		x	x		x	x
Familiarity A						
Familiarity B						x
Familiarity C					x	
RP	x	x	x	x		x
AP					x	
Classical	x		x	x	x	x
Heavy metal						x
Hip hop	x	x				x
Gothic						
Rock		x	x		x	x
Jazz	x	x		x		x
Gospel						
Soul/R&B	x				x	x
Trance/techno						

	NM 13	NM 14	NM 15	NM 16	NM 17	NM 18
Gender	M	F	F	M	F	F
Age	26	21	22	19	25	25
Strategy	Attempted to identify recurring motifs.	Listen to the start of each musical box.	Find a possible beginning and ending, then a refrain and fill in the gap from there.	Try to listen all the track first with Autoplay then try to complete the puzzle	Mostly just what 'sounds right' intuitively, but i know that the ending shouldn't cut off abruptly and there should be some repeating phrases.	Grouping same style of pieces
Training	NA	NA	NA	NA	6	6
Instrument	NA	NA	NA	NA	Piano and violin	
Time A	360	49	30	40	50	60
Time B	240	42	26	40	45	60
Time C		40	18	35	50	30
Accuracy A	9.38	6.25	18.8	15.6	15.6	15.6
Accuracy B		9.68	6.45		6.45	3.23
Accuracy C		5	10	15	15	15
Score A	75	84.4	78.1	78.1	75	62.5
Score B	58.1	83.9	77.4	83.9	74.2	58.1
Score C		45	45	35	65	75
FNMA A	50	56.3	59.4	43.8	40.6	40.6
FNMA B	48.4	51.6	48.4	48.4	41.9	48.4
FNMA C		45	55	45	45	10
UE A						
UE B		x				
UE C		x	x			x
Familiarity A						x
Familiarity B						
Familiarity C						
RP	x	x	x	x	x	x
AP						
Classical	x		x		x	x
Heavy metal	x					
Hip hop	x			x		
Gothic						
Rock	x		x		x	
Jazz	x		x			
Gospel						
Soul/R&B			x	x		
Trance/techno						

Appendix 4: Demographic Data for S Participants

	S1	S2	S3	S4	S5
Gender	F	F	F		F
Age	19	20	19		19
Strategy	I first define major/minor, then find similarities of the phrases. Consider modulation, and visualized what I hear for marking/noting which phrase is which. Last stage is ordering them, then playing them.	Write down key of each track, mark down either beginning/middle/end, use common sense, listen to the original track given after 10 minutes of working.	Roughly know how the melody goes but got quite frustrated in the second last row as 1-2 puzzle should be in different places but I couldn't figure it out.	I tried to think of which parts would fit into each part of sonata form and which might be the beginning and end themes of these. However, as there were too many tracks to keep track of, it proved too difficult to order. I just kept feeling lost and overwhelmed.	Singing the different parts, trying to work out which excerpts were in similar keys or had similar affections at certain points. It was incredibly hard to solve as the excerpts got further away from the original melody that I recognised at the start. Even with some sort of musical training I couldn't order the ending. Puzzle 2: Similarly to the first puzzle, I found it very hard to solve after the first section. The developments of the sonata (?) were where I struggled in comparison to the opening of the exposition. I tried to listen to work out what keys the different excerpts were in.
Training	14	16	12	11	9
Instrument	Piano, cello	Piano, trombone, violin, horn, cello	Piano, violin	Flute, violin and piano	Trumpet
Time A	90	98	100	120	180
Time B	240	136		180	240
Time C		58			40
Accuracy A	81.3	34.3	53.1	6.25	40.6
Accuracy B	22.6	3.2			12.5
Accuracy C		25		15	
Score A	90.6	53.1	78.1	37.5	84.2
Score B	64.5	54.8		38.7	56.3
Score C		85		60	
FNMA A	6.25	31.3	18.8	3.75	3.13
FNMA B	32.3	25.8		29	
FNMA C		40		45	
UE A					
UE B					
UE C					
Familiarity A			x		x
Familiarity B	x				
Familiarity C					
RP	x		x	x	
AP		x			
Classical	x	x	x	x	x
Heavy metal					
Hip hop					
Gothic					
Rock				x	x
Jazz			x	x	x
Gospel		x		x	
Soul/R&B					
Trance/techno				x	

	S6	S7	S8	S9	S10
Gender	M	M	M	M	F
Age	19	18		20	19
Strategy	I organised the clips into different categories according to their sound, key, style, and structure. Then I selected clips and listened to them against each other, attempting to vary which categories they came from. I found the first clip and the last clip first, and then worked forward and backward to meet at the middle. Puzzle 2: I grouped together different sounding clips, i.e. cadences, main themes, build ups etc. and then listened to different combinations, piecing them together by trial and error.	Trying to work out sections (main theme, subordinate theme, etc.) and keys.	I looked first for clips which were either identical or transpositions of one another. I then looked for trends between groups of linked clips to see if, put together, they might become recurring themes. I found this was the case. I then tried to link these themes with clips I believed as linking themes (eg. clip 1) and	Using a rudimentary understanding of sonata form, I tried to ascertain which section the fragments were taken from. I also, using perfect pitch, established key at the start of end the fragments, attempting to join either the same or related keys in 'correct' progressions. Having also played a number of piano sonatas, I feel as if there's a certain feel to each part of the form, and put this across in the way I have ordered	With a piece of paper in front of me, grouping the extracts in the same key so that I knew if the music was, say, in G major in the previous extract, then I would look first in the G major group for the next extract.
Training	8	11	6	15	12
Instrument	Piano, voice	Cello, piano	6 (unspecified)	Organ, piano, voice, flute	Flute, organ, voice, piano
Time A	90	150	120	70	45
Time B	80			60	30
Time C				35	35
Accuracy A	15.6	18.8	84.4	43.8	100
Accuracy B	19.4			29	100
Accuracy C				20	100
Score A	43.8	64.3	93.8	68.8	100
Score B	74.2			67.7	100
Score C				65	100
FNMA A	34.4	12.5	3.13	18.8	0
FNMA B	25.8			29	0
FNMA C				50	0
UE A					
UE B					
UE C					
Familiarity A			x		x
Familiarity B					
Familiarity C					x
RP	x	x	x		x
AP				x	
Classical		x	x	x	x
Heavy metal					
Hip hop	x		x		
Gothic					
Rock				x	
Jazz			x	x	x
Gospel					
Soul/R&B	x		x		x
Trance/techno	x				

	S11	S12	S13	S14	S15
Gender	F	M		M	F
Age		18		37	18
Strategy	Tried to find the beginning and end and then fill in the middle by connecting the end of one clip to another.	Tried to listen to the beginning and ends of each clip and match the two	Tried to identify cadences and sequences	I tried to find the beginning and ending first, then filled in the middle.	Identified beginning and end, grouped clips into similar ones likely to be in the same section, arranged them within their groups
Training	10	10	9	10	10
Instrument	Piano, clarinet, violin, guitar	Piano	Violin, trumpet, piano	Guitar	Voice, piano, violin
Time A	45	90	75	120	70
Time B	60	90	75	50	50
Time C	30	90	45	60	15
Accuracy A	28.1	40.6	28.1	12.5	9.38
Accuracy B	6.45	9.68	16.1	6.45	
Accuracy C	30	15		20	20
Score A	93.8	71.9	90.6	43.8	84.4
Score B	83.9	51.6	80.6	71	58.1
Score C	50	45	75	60	50
FNMA A	34.4	31.3	21.9	40.6	43.8
FNMA B	35.5	38.7	41.9	35.5	32.3
FNMA C	45	35	35	40	35
UE A		x			
UE B					
UE C					
Familiarity A	x				
Familiarity B					
Familiarity C					
RP	x	x	x	x	x
AP					
Classical			x	x	x
Heavy metal					
Hip hop		x			
Gothic					
Rock	x		x	x	
Jazz					x
Gospel					
Soul/R&B		x	x		x
Trance/techno				x	

Appendix 5: Demographic Data for F Participants

	F1	F2	F3	F4	F5	F6
Gender	M		M	M	F	F
Age	22	24	22	20	22	21
Strategy	First I linked the clips that obviously belonged together, which gave me a smaller number of chains. Consecutively, I arranged these chains considering syntax, dynamics, stylistic cues and etc. I had to break apart some of these chains that I linked at the first stage as I was trying to create the most coherent whole. Puzzle 2: This was more confusing for me than the first puzzle. I have tried to follow a similar approach of creating chains and attempting to arrange a coherent piece by reorganising the chains of excerpts together. However, I found this puzzle more challenging because I thought the piece was syntactically less predictable, which prevented me from reaching a truly coherent solution.	Listened to all chunks twice, grouped them by thematic content, annotated their tonality, had sonata form in mind, started to arrange them in sequence, rearranged many times, gave up! Struggled most with 21, 33, 27 and 31. Puzzle 2: labelled tonality for each chunk, paired chunks that fitted together, guessed quite a lot, not very satisfied with my solution compared to the first puzzle.	Very difficult, trying to piece together bit by bit as I know it well. Puzzle 2: tried to identify themes. Began by finding beginning and end, then tried to fill in the gap.	I believe at the beginning of every question I would listen to all the tracks first try to understand the overall genre or tone of the piece is. I would then categorise each clips, for example, some that might have sounded like the end of the piece, start of the piece, cadences, and especially ones that sound similar. It was rather difficult to figure out the overall form but with categorising it I try to put it together like puzzle pieces. Such as putting a clip that sounded like a beginning of a theme with one that sounded like it continued from it and end with a cadence. I might be remembering wrong, but in the final piece I might have organised the clips overall in its categories because i couldn't figure out the whole structure. Again this might be wrong I'm not 100% sure if I did do that in the end. Just to summaries I guess it would be, listen, categories and puzzle together.	Identified any changes if tempo and some changes of key and matched them up	First idea was to figure out the overall key and the key of each puzzle piece, whether it's a cadence, an LIP or transitional element to categorise them. But the synthesis was too time-consuming this way. I then resorted to puzzling one piece to the next without bearing in mind structural significance. This would have been necessary to accurately stick to e.g. sonata form, however.
Training	12	5	10	14	15	16
Instrument	Piano, guitar	Piano, voice	Piano, guitar	Piano	Flute, piccolo, sax	Piano
Time A	600	105	35	40	120	120
Time B	180	90	20	35	70	30
Time C				40	65	20
Accuracy A	46.9	59.4	78.1	18.2	21.9	12.5
Accuracy B	16.1	48.4	22.6	3.1	18.8	6.25
Accuracy C				15	5	20
Score A	87.5	84.4	87.5	71.9	62.5	56.3
Score B	64.5	77.4	51.6	54.8	62.5	75
Score C				45	40	50
FNMA A	3.13	30	0	28.1	28.1	43.8
FNMA B	19.4	12.9	25.8	29	16.1	23.8
FNMA C	NA			30	30	35
UE	No unfinished ending at all!					
Familiarity A			x			x
Familiarity B		x				x
Familiarity C						x
RP	x	x	x	x	x	x
AP						
Classical	x	x	x			
Heavy metal						
Hip hop				x		
Gothic	x					
Rock	x	x	x	x		x
Jazz			x	x	x	x
Gospel					x	
Soul/R&B		x				
Trance/techno						

Appendix 6: Further Tables from Chapter 3.5.2

Table 89 Functional performance: $M > B < H$

Functionality $M > B < H$	
F	NA
S	NA
NM	26.7%

Beethoven is perceived to be more difficult than Mozart and Haydn by only 26.7% of NM respondents. None from F and S think likewise.

Table 90 Functional performance: $M < B < H$

Functionality $M < B < H$	
F	NA
S	22.2%
NM	6.67%

Beethoven is perceived to be easier than Mozart, but more difficult than Haydn, by 22.2% of S and 6.67% of NM. No one from the F group thinks likewise.

Table 91 Functional performance: $M < B > H$

Functionality $M < B > H$	
F	NA
S	11.1%
NM	20%

Beethoven is perceived to be easier than Mozart and Haydn by 11.1% of S and 20% of NM participants. No F candidate demonstrated this inclination.

Table 92 Functional performance B < M < H

Functionality B < M < H	
F	NA
S	NA
NM	26.7%

Mozart is perceived to be easier than Beethoven, but more difficult than Haydn, by 26.7% of NM respondents.

Table 93 Functional performance B > M < H

Functionality B > M < H	
F	NA
S	33.3%
NM	13.3%

Mozart is perceived to be more difficult than Haydn and Beethoven by 33.3% of S and 13.3% of NM participants.

Table 94 Functional performance B < M > H

Functionality B < M > H	
F	NA
S	NA
NM	46.7%

Mozart is only perceived to be easier than Haydn and Beethoven by 46.7% of NM participants; the remaining subjects in this experiments did not seem to think likewise.

Table 95 Functional performance B > M > H

Functionality B > M > H	
F	NA
S	NA
NM	20%

Mozart is perceived to be more difficult than Beethoven, but easier than Haydn, by 20% of NM participants. Neither F nor S think likewise.

Appendix 7: Mother Table Detailing IiC

Initiation in/as Continuation																
	M						B						H			
	Clip	Type	IiC	Sectional			Clip	Type	IiC	Sectional			Clip	Type	IiC	Sectional
NM						NM						NM				
1	18	CBI		Y												
	28	CBI		Y												
2	28	CBI		Y												
	32	CBI	Y													
	18	CBI		Y												
	23	CBI	Y													
3	32	CBI		Y		3	6	S	Y	Y		3	5	P		Y
	14	P		Y			10	S	Y							
	26	P		Y			8	P	Y	Y						
	18	CBI	Y													
4	18	CBI		Y		4	23	P	Y	Y						
	23	CBI	Y													
	32	CBI		Y												
	28	CBI	Y													
												5	19	P		Y
7	23	CBI		Y		7	24	P		Y		7	5	P		Y
							25	P		Y						
						8	6	S		Y		8	5	P		Y
							5	S	Y							
							8	P		Y						
							17	S	Y							
9	32	CBI		Y		9	5	S		Y						
							25	P		Y						
10	18	CBI		Y								10	8	P		Y
	23	CBI	Y													
	28	CBI		Y												
	32	CBI	Y													
11	32	CBI		Y		11	16	S		Y		11	8	P		Y
	28	CBI		Y												
12						12	25	P		Y						
	18	CBI	Y	Y												
	23	CBI	Y													
	28	CBI	Y													
13	23	CBI		Y		13	25	P		Y						
	18	CBI		Y			16	S	Y							
							24	P		Y						
14	23	CBI		Y								14	19	P		Y
	26	P		Y												
15	18	CBI		Y		15	5	S		Y		15	5	P		Y
	23	CBI	Y				8	P	Y				8	P		Y
	32	CBI	Y				23	P		Y						
16	28	CBI		Y												
	23	CBI		Y												
						17	10	S		Y		17	11	P		Y
							6	S		Y			19	P		Y
							22	S	Y							
							1	S	Y							
18	23	CBI		Y		18	17	S		Y						
							23	P		Y						
							24	S	Y							
Sub-total CBI		32	12	24		Sub-total S		15	11	19		Sub-total S			0	11
Sub-total P		3				Sub-total P		12				Sub-total P		11		

Initiation in/as Continuation																
	M						B						H			
	Clip	Type	liC	Sectional			Clip	Type	liC	Sectional			Clip	Type	liC	Sectional
S																
1	32	CBI		Y												
2	32	CBI		Y		2	1	S		Y						
							17	S		Y						
							10	S	Y							
							16	S	Y							
4	26	P		Y												
	32	CBI		Y												
	23	CBI		Y												
6	32	CBI		Y												
11	23	CBI		Y												
	32	CBI	Y													
	28	CBI	Y													
						12	10	S		Y						
							1	S		Y						
13	23	CBI		Y		13	6	S		Y						
	18	CBI		Y			24	P		Y						
	28	CBI		Y												
	32	CBI		Y												
14	14	P		Y		14	17	S		Y						
	26	P		Y												
	28	CBI		Y												
	18	CBI	Y													
	23	CBI	Y													
15	28	CBI		Y		15	16	S		Y						
							6	S	Y							
							10	S		Y						
							17	S	Y							
Sub-total CBI		16	4	15		Sub-total S		12	4	9						
Sub-total P		3				Sub-total P		1								
F																
						1	17	S		Y						
							8	P		Y						
4	28	CBI		Y		4	8	P		Y		4	19	P		Y
							11	P	Y							
5	26	P		Y		5	11	P		Y		5	19	P		Y
	23	CBI	Y				16	S	Y							
	18	CBI		Y			25	P	Y							
	32	CBI	Y													
6	26	P		Y		6	24	P		Y		6	8	P		Y
	23	CBI		Y			11	P		Y						
	28	CBI		Y			1	S		Y						
	32	CBI	Y													
Sub-total CBI		7	3	6		Sub-total S		3	3	7		Sub-total S			0	3
Sub-total P		2				Sub-total P		7				Sub-total P		3		

Appendix 8: Leftover

Leftover Mozart							Leftover Beethoven							Leftover Haydn						
	Total	Cad	Cont	I	UE	Weak E		Total	Cad	Cont	I	UE	Weak E		Total	Cad	Cont	I	UE	Weak E
NM							NM							NM						
1							1							1						
2							2							2						
3	7	3	2	2	Y		3							3						
4							4							4						
5							5							5	9	2	6	1	Y	
6							6							6	7	1	6		Y	
7							7							7						
8	8	3	2	3		Y	8							8						
9	4	1	1	2		Y	9							9	3		2	1	Y	
10							10							10						
11							11							11						
12							12							12	5	3	2		Y	
13							13							13						
14							14	7	2	3	2	Y		14						
15							15							15	6		4	2	Y	
16							16							16						
17							17							17						
18							18							18	9		8	1	Y	
Total	19	7	5	7	1	2	Total	7	2	3	2	1		Total	39	6	28	5	6	
S							S							S						
1							1							1						
2							2							2						
3							3							3						
4							4							4						
5							5							5						
6							6							6						
7							7							7						
8							8							8						
9							9							9						
10							10							10						
11							11							11						
12	8	3	5		Y		12							12						
13							13							13						
14							14							14						
15							15							15						
Total	8	3	5		1		Total							Total						
F							F							F						
1							1							1						
2							2							2						
3							3							3						
4							4							4						
5							5							5						
6							6							6						
Total							Total							Total						
Total	27	10	10	7	2	2	Total	7	2	3	2	1		Total	39	6	28	5	6	

Appendix 9: Pile-up

Pile-up Mozart							Pile-up Beethoven							Pile-up Haydn					
	Total	Cad	Cont	I				Total	Cad	Cont	I				Total	Cad	Cont	I	
NM							NM							NM					
1							1							1					
2							2							2					
3	7	3	2	2			3							3					
4							4							4	7	3	4		
5	5	3	2				5							5	9	2	6	1	
6							6							6	7	1	6		
7							7							7	8	3	4	1	
8	8	3	2	3			8							8					
9	4	1	1	2			9							9	3		2	1	
10							10							10					
11							11							11					
12							12							12	5	3	2		
13	4	2	2				13							13					
14							14	7	2	3	2	?		14					
15	5	2	3				15							15	6		4	2	
16	9	1	7	1			16							16					
17	4	3	1				17							17					
18							18							18	9		8	1	
Total	46	18	20	8			Total	7	2	3	2			Total	54	12	36	6	
S							S							S					
1							1							1					
2							2							2					
3							3							3					
4							4							4					
5							5							5					
6							6							6					
7							7							7					
8							8							8					
9							9							9					
10							10							10					
11							11							11					
12	8	3	5				12							12	6	2	4		
13	13	5	3	4			13							13					
14	12	6	6				14	7	2	5				14					
15							15							15					
Total	33	14	14	4			Total	7	2	5				Total	6	2	4		
F							F							F					
1							1							1					
2							2							2					
3							3							3					
4	2	2					4							4					
5	5	5					5	3	2	1				5					
6							6							6					
Total	7	7					Total	3	2	1				Total					
Total	86	39	34	12			Total	17	6	9	2			Total	60	14	40	6	

Appendix 10: S12 Mozart Reconstruction

Sonata sp	Key	Desc	Answer	Sonata		Rating
				Space	Description	
Expo pt 1	14	P-theme statement response	14	Expo	P stat resp	5
	16	Continuation	16	Expo	P cont	5
	22	Cadential	17	Expo	P cad	4
	24	Continuation repeated	24	Expo	P cont	3
	17	Cadential repeated	22	Expo	P cad	3
	1	Transition and I: HC MC	28	Recap	S CBI	3
Expo pt 2	18	S-theme CBI	29	Recap	TR	1
	23	S CBI repeated	18	Expo	S CBI	3
	2	S Continuation and Continuation repeated	23	Expo	S CBI rep	3
	3	Fragmentation of Continuation	5	Expo	Prinner rep	1
	19	Cadence and OMT	31	Dev	Dev	5
	21	Fragmentation of Continuation rep	30	Dev	ReTR	5
	4	Cadence	26	Recap	P	5
	20	Postcadential and Prinner	6	Recap	P'	5
	5	Prinner repeated	7	Recap	P cad	5
	25	End of exposition	15	Expo	End	1
Dev	31	Development theme	2	Expo	S CI	5
	27	Development repeated	3	Expo	Cont of CI	5
	30	TR	4	Expo	Cad after OMT	5
Recap pt 1	26	P recap	21	Expo	S cont of CI rep	5
	6	P modified statement response	19	Expo	Cad OMT	5
	7	Cadential	25	Expo	End	5
	29	Transition and I: HC MC	32	Recap	S CBI rep	1
Recap pt 2	28	S CBI	13	Recap	Cad after OMT	5
	32	S CBI repeated	10	Recap	Postcad	5
	8	S Continuation and Continuation repeated	33	Recap	S cont of CI	3
	33	Fragmentation of Continuation	8	Recap	S CI	3
	12	Cadence and OMT	9	Recap	S cont CI'	3
	9	Fragmentation of Continuation rep	11	Recap	Prinner rep	1
	13	Cadence after OMT	20	Expo	Postcad	1
	10	Postcadential and Prinner	27	Dev	Dev rep	1
	11	Prinner repeated	12	Recap	Cad OMT	1
	15	End	1	Expo	TR	1

Appendix 11: Unfinished Ending by NM Participants

Table 96 Unfinished endings by NM

	The unfinished ending is...	Mozart	Beethoven	Haydn
NM2	The Mozart reconstruction ends with a reprise of the I: sequential thirds; the Beethoven on the III/iii: postcadential from the end of the exposition.	The start of the reconstruction consists of an extensive melodic chunk made up of both P- and S-themes. This pattern is repeated, resulting in a plethora of 'leftovers' towards the end of the answer.	This answer is based on thematic similarity and as such displays quite a structured attempt at strophic writing. The various PACs in this piece, however, are deployed to conclude strophes with none left for the very end.	
NM3	The Mozart ends on V: S CBI.	NM 3 shows awareness of thematic similarity in the first half of the answer. The quality of thematic grouping in the second half, however, falters, resulting in 'leftovers'.		
NM4	The Beethoven ends on III/iii: postcadential from the end of the exposition, whilst the Haydn concludes on the ReTR.			NM 4 recognised the importance of the P-theme in this movement – each melodic chunk starts with a section from the thematic group. Considering that this candidate performs moderately in terms of functional awareness and strophe construction, the use of ReTR to end the answer is rather bewildering... Sequential accuracy

				is very low in this answer.
NM5	The Mozart ends on V: postcadential, whilst the Haydn concludes with the statement of the P-theme.	Thematic similarity seems to have been the principal organisational tool, resulting in a reconstruction that can be divided roughly into two parts: P- and S-based. The final part of the answer, however, consists of 'leftovers,' which may explain the use of postcadential phrase as the ending.		Although there are a few sequentially accurate snippets, this answer generally lacks organisation, which results in 'leftovers' that perhaps explains the misuse of an initiation function at the end.
NM6	The Haydn ends on the retransition.			The first half of the reconstruction was very logically carried out with a high degree of accuracy. Towards the middle, however, the sense of form deteriorated. The development failed to recapitulate and not all developmental sections managed to be grouped together; moreover, the premature recapitulation of P did not help. This left one too many 'fluid' entities as 'leftovers' –as NM 6 herself put it, she was thoroughly

				confounded by the end.
NM8	The Mozart reconstruction ends with a reprise of the I: sequential thirds; the Haydn, though ending on a PAC, cannot be categorised as being fully concluded as the PAC chosen by this candidate originates from P-space – it is not impactful enough to constitute a satisfactory ending to the sonata. On a whole, both answers do not suggest that NM 8 was aware of the form implied.	The Mozart does not display any hint of tripartite structure, nor does it show that NM 8 recognised P as such. He did, however, organise each melodic block around a particular melodic material, i.e. P-based, S/CBI-based, etc.		Perhaps due to the smaller amount of material in the Haydn, NM 8's Haydn reconstruction is more clearly laid out; the thematic categorisation in this puzzle, too, was more obvious. Although there is nothing in the answer to suggest that NM 8 recognised the presence of a tripartite structure at all, the answer clearly suggests a recognition of P-theme as the backbone of the piece: each melodic chunk starts with an element from the main theme.
NM9	The Mozart ends with I: CBI from S-theme, which is clearly not end-like in any sense; the Haydn ends with the iteration of the second sequential motion from the developmental section. Both of these are not cadential functions at all.	The promising manner in which this reconstruction starts soon falters as NM 9 failed to categorise and structure her answer: there is no evidence of formal recognition and thematic similarity did not seem to be a useful guiding principle, either.		This reconstruction does not show signs of organisation apart from the slightly suggested reliance on TR as the head motif of the piece.
NM10	The Haydn ends on a weak PAC, i.e. the response to the P-theme.			Not all PACs carry equal weight, which renders this reconstruction

				rather unfinished. This reconstruction begins and ends with the iteration of P-theme. Thematic organisation is evident in this version, mainly centred around P-theme.
NM11	The Haydn ends on a weak PAC, i.e. the response to the statement of P-theme.			Not all PACs carry equal weight, which renders this reconstruction rather unfinished. Interestingly, there is a double-PAC moment at the very end, with the original ending being the penultimate clip. Organisation is apparent in this reconstruction, with the P-theme dominating as the main motif opening each melodic chunk.
NM12	The Haydn ends on a weak PAC, i.e. the response to the P-theme statement.			This is another double-PAC moment with the actual ending being assigned penultimate position and the weaker PAC carrying the task of concluding the piece. There is a tripartite feel to this reconstruction, although it is by no means an accurate representation of sonata form.
NM14	Both the Beethoven and the Haydn end on pregnant dominant harmonies as seen in		The reconstruction is fairly structured but does not seem to be	The main theme in this sonata was correctly identified

	the false MC and first MC iteration respectively.		based on thematic similarity – functional recognition seems to have been the main guiding principle, seeing as this candidate scored 83.9% functionally whilst displaying a lack of thematic organisation.	and used as the basis of the two big chunks that make up the majority of this reconstruction. The final part of the answer, however, lacks clarity somewhat, with the final clip, i.e. V: dominant leading to the first MC statement, seemingly tossed at the end as a final resort.
NM15	The Haydn ends with the first sequential movement in the developmental section.			It is somewhat obvious that thematic similarity was used as the basis for this reconstruction – the P-theme was recognised as the head motif and used as such. That said, functional awareness suffered in this puzzle, which perhaps explains the pile-up of initiating and continuation functions at the end, resulting in an unfinished music.
NM18	The Haydn ends on the retransition.			A logical reconstruction to start with, but suffers from premature recapitulation and, consequently, a lack of symmetry. The

				developmental sections, too, were not grouped together completely, resulting in 'leftovers' and one too few PACs in the supply cabinet.

Appendix 12: Glossary of theoretical terms

Antecedent: An initiating intrathematic function consisting of a unit that closes with a weak cadence, thus implying a repetition (a consequent) to bring a stronger cadential closure.

Basic idea: An initiating function consisting of a two-measure idea that usually contains several melodic or rhythmic motives constituting the primary material of a theme.

Compound basic idea: An initiating intrathematic function. A four-measure phrase consisting of a basic idea followed by a contrasting idea, which does not lead to a cadential closure.

Usually supported by a tonic prolongational progression.

Consequent: A concluding intrathematic function that repeats a prior antecedent but ends with a stronger cadential closure.

Continuation: A medial intrathematic function that destabilises the prevailing formal context by means of fragmentation, harmonic acceleration, faster surface rhythm, and harmonic sequence.

Contrasting idea: A concluding function consisting of a two-measure unit that follows and contrasts with (i.e. is not a repetition of) a basic idea.

Dominant-lock: An extension of a dominant arrival, a prolonged passage that is based on the dominant.

Essential expositional closure (EEC): The first satisfactory perfect authentic cadence within the exposition, at the end of the secondary theme, that proceeds onward to differing material.

Essential structural closure (ESC): The first satisfactory perfect authentic cadence in the tonic within the recapitulation, normally at the end of the secondary theme, that proceeds onward to differing material.

Medial caesura (MC): The brief, rhetorically reinforced break or gap that serves to divide an exposition into two parts, tonic and dominant (or tonic and mediant in most minor-key sonatas).

One more time (OMT): Coined by Janet Schmalfeldt, this refers to a procedure of repetition induced by an evaded cadence.

P-theme: The idea that begins the sonata process, and with the initial impulse of primary theme we have taken the first step that will trigger sequentially the other sonata stages.

P-space: The sonata zone that contains the P-theme and its various iterations, up until the music enters the transitory zone.

Perfect authentic cadence (PAC): An authentic cadence in which the soprano voice ends on the tonic scale-degree.

Period: A compound theme consisting of an eight-measure antecedent and an eight-measure consequent.

Presentation: An initiating intrathematic function consisting of a unit (usually a basic idea) and its repetition, supported by a prolongation of tonic harmony.

S-theme

S-space: The sonata zone that contains the S-theme and its various iterations, up until the iteration of the EEC.

Sentence: A simple theme consisting of a presentation phrase, a continuation, a cadential.

This page of musical notation, numbered 333, contains six systems of piano music. The key signature is G major (one sharp) and the time signature is 4/4. The notation includes various musical elements such as trills, tremolos, and dynamic markings.

- System 1:** Features a trill in the right hand and a tremolo in the left hand.
- System 2:** Includes dynamic markings *p* (piano) and *f* (forte).
- System 3:** Features a trill in the right hand and a tremolo in the left hand.
- System 4:** Includes dynamic markings *f* (forte) and *p* (piano).
- System 5:** Includes dynamic markings *p* (piano) and *f* (forte).
- System 6:** Includes dynamic markings *f* (forte) and *p* (piano).

This page of musical notation, numbered 334, contains seven systems of staves. The music is written for piano and is in G major (one sharp) and 4/4 time. The notation includes treble and bass clefs, key signatures, and various musical symbols such as slurs, ties, and trills. The music features a variety of textures, including arpeggiated figures, flowing sixteenth-note passages, and dynamic contrasts marked with 'f' (forte) and 'p' (piano). The systems are as follows:

- System 1: Treble and bass staves. The bass staff has a continuous arpeggiated figure. The treble staff has a melody with slurs and dynamic markings 'f' and 'p'.
- System 2: Treble and bass staves. The bass staff has a continuous arpeggiated figure. The treble staff has a melody with slurs and dynamic markings 'f' and 'p'.
- System 3: Treble and bass staves. The bass staff has a continuous arpeggiated figure. The treble staff has a melody with slurs and dynamic markings 'f' and 'p'.
- System 4: Treble and bass staves. The bass staff has a continuous arpeggiated figure. The treble staff has a melody with slurs and dynamic markings 'f' and 'p'.
- System 5: Treble and bass staves. The bass staff has a continuous arpeggiated figure. The treble staff has a melody with slurs and dynamic markings 'f' and 'p'.
- System 6: Treble and bass staves. The bass staff has a continuous arpeggiated figure. The treble staff has a melody with slurs and dynamic markings 'f' and 'p'.
- System 7: Treble and bass staves. The bass staff has a continuous arpeggiated figure. The treble staff has a melody with slurs and dynamic markings 'f' and 'p'.

(39) 5

The musical score consists of two systems. The first system (measure 39) begins with a piano (*p*) dynamic marking. The treble staff contains a melodic line with eighth and sixteenth notes, while the bass staff provides a simple accompaniment with quarter notes. The second system (measure 40) continues the melodic line in the treble staff and introduces a more complex accompaniment in the bass staff, featuring sixteenth-note patterns. The key signature is one sharp (F#), and the time signature is 4/4.

Appendix 14: Beethoven, Op. 31 no. 1, first movement

Allegro vivace.

Sonate N^o16.

The musical score is written for piano and consists of six systems of staves. The first system shows the beginning with a piano (*p*) dynamic. The second system includes a forte (*f*) dynamic. The third system includes a piano (*p*) dynamic. The fourth system includes a crescendo (*cresc.*) marking. The fifth system includes a forte (*f*) dynamic. The sixth system includes a piano (*p*) dynamic.

This musical score consists of six systems of piano music. The notation is written for a grand piano, with a treble and bass staff joined by a brace. The key signature is one sharp (F#), and the time signature is 4/4. The score is characterized by dense, complex textures, often featuring multiple layers of chords and rapid sixteenth-note passages in both hands. Dynamic markings are used throughout to indicate volume changes: *f* (forte) appears in the first system, *p* (piano) in the second and fourth systems, and *sf* (sforzando) in the third and fifth systems. The second system also includes a *cresc.* (crescendo) marking. The sixth system concludes with a *cresc. -* marking, indicating a crescendo that leads into a final, sustained chord. The overall style is highly technical and expressive, typical of late Romantic or early 20th-century piano literature.

B.139.

This page contains six systems of musical notation for piano. The key signature is G major (one sharp) and the time signature is 3/4. The notation includes various dynamics and articulations:

- System 1:** Treble and bass staves. Dynamics include *f* and *p*.
- System 2:** Treble and bass staves. Dynamics include *pp*, *cresc.*, and *p*.
- System 3:** Treble and bass staves. Includes first and second endings marked "1." and "2.". Dynamics include *f* and *p*.
- System 4:** Treble and bass staves. Dynamics include *f* and *p*.
- System 5:** Treble and bass staves. Dynamics include *f*.
- System 6:** Treble and bass staves. Dynamics include *f*.

This page contains seven systems of musical notation, each consisting of a treble and a bass staff. The music is written in a key with one sharp (F#) and a common time signature. The notation includes various musical elements such as eighth and sixteenth notes, rests, and dynamic markings. The first system shows a complex, fast-paced melody in both hands. The second system features a more active bass line with some rests in the treble. The third system has a melodic line in the treble with a trill (tr) and a steady bass accompaniment. The fourth system continues the bass-driven accompaniment. The fifth system shows a more complex interplay between the two hands. The sixth system features a melodic line in the treble with a crescendo (cresc.) and a steady bass accompaniment. The seventh system shows a melodic line in the treble with a crescendo (cresc.) and a steady bass accompaniment. The page concludes with a final chord in the bass staff.

This page of musical notation consists of seven systems of staves, each containing a grand staff (treble and bass clefs). The music is written in a key with one sharp (F#) and a 2/4 time signature. The notation includes various musical symbols such as notes, rests, beams, and slurs. Dynamics are indicated by *pp*, *ff*, *p*, *f*, *cresc.*, and *sf*. The piece concludes with a double bar line and the number B. 139.

pp *pp* *ff*

p *f*

p *f* *p* *f* *p*

cresc. *p*

f *sf*

cresc. *ff* *p*

B. 139.

Handwritten musical score for piano, measures 1 through 12. The score is written in G major (one sharp) and 4/4 time. It features a complex interplay between the right and left hands. The right hand often plays chords and moving lines, while the left hand provides a steady accompaniment with eighth and sixteenth notes. Dynamics include *f* (forte), *p* (piano), *pp* (pianissimo), and *ff* (fortissimo). A *cresc.* (crescendo) marking is present in measure 10. The piece concludes with a final chord in measure 12.

This page contains six systems of musical notation for a piano piece. The notation is written for two staves (treble and bass clef) and includes various musical symbols such as notes, rests, and dynamic markings.

The first system shows a continuous flow of eighth and sixteenth notes in both hands. The second system introduces some triplet markings and a *sf* (sforzando) marking. The third system features a *pp* (pianissimo) marking and a *p* (piano) marking. The fourth system is marked *sempre pp* and includes triplet markings. The fifth system continues with triplet markings and a *sf* marking. The sixth system concludes with a *ff* (fortissimo) marking, a first ending bracket labeled '1', and a *p* (piano) marking.

Appendix 15: Haydn, Hob. XVI no. 22, first movement

Nº 34. *Allegro moderato.*

The musical score is for a piano solo in G major, 3/4 time, marked *Allegro moderato*. It is numbered 34. The score is written for two staves (treble and bass clef). The first system is marked *f p* and includes fingerings (1 2 3 4, 1 2 3 4, 1 2 3 4, 1 2 3 4) and a trill. The second system is also marked *f p* and includes fingerings (1 2 3 4, 1 2 3 4, 1 2 3 4, 1 2 3 4). The third system is marked *dolce* and includes fingerings (1 2 3 4, 1 2 3 4, 1 2 3 4, 1 2 3 4). The fourth system is marked *cresc.* and includes fingerings (1 2 3 4, 1 2 3 4, 1 2 3 4, 1 2 3 4). The fifth system is marked *cresc.* and includes fingerings (1 2 3 4, 1 2 3 4, 1 2 3 4, 1 2 3 4). The sixth system is marked *f* and includes fingerings (1 2 3 4, 1 2 3 4, 1 2 3 4, 1 2 3 4).

The musical score on page 57 consists of seven systems of piano music. Each system is written for a grand piano, with a treble staff and a bass staff. The key signature is three sharps (F#, C#, G#). The music is characterized by intricate rhythmic patterns, including triplets and sixteenth notes, and dynamic markings such as *f*, *p*, *cresc.*, and *mf*. The notation includes various fingerings and articulations, such as slurs and accents. The first system shows a complex rhythmic pattern in the treble staff and a more melodic line in the bass. The second system features a *f* dynamic in the treble and a *p* dynamic in the bass, with a *cresc.* marking. The third system continues the *cresc.* dynamic. The fourth system shows a *f* dynamic in the treble and a *p* dynamic in the bass, with a *cresc.* marking. The fifth system features a *f* dynamic in the treble and a *p* dynamic in the bass, with a *cresc.* marking. The sixth system shows a *f* dynamic in the treble and a *p* dynamic in the bass, with a *cresc.* marking. The seventh system features a *f* dynamic in the treble and a *p* dynamic in the bass, with a *cresc.* marking.

58

58

f p

f p

fz

fz

Adagio. Tempo I.

dimin.

p

dolce

cresc.

cresc.

f

f

The musical score is written for piano and consists of seven systems of two staves each (treble and bass clef). The key signature is three sharps (F#, C#, G#). The score includes various musical notations such as dynamics (*f*, *p*, *fz*, *dimin.*, *p*, *cresc.*, *f*), articulation (*dolce*), and fingerings (numbers 1-5). The tempo marking is *Adagio. Tempo I.*

59

The musical score for measures 59 and 60 is written in G major (one sharp) and 4/4 time. Measure 59 begins with a piano introduction marked *f* in the bass and *mf* in the treble. The bass line features a series of eighth notes and chords, while the treble line has a melodic line with eighth notes and chords. Measure 60 continues the piano introduction with a mezzo-forte (*mf*) dynamic in the bass and a piano (*p*) dynamic in the treble. The bass line has a melodic line with eighth notes and chords, while the treble line has a series of eighth notes and chords. The score includes various musical notations such as eighth notes, sixteenth notes, and chords, along with fingerings and articulation marks.

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