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Exploring Stretto: An Investigation into the Use of Stretto in J. S. Bach's Well-Tempered Clavier

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Abstract

Stretto—the technique of using a fugue subject in counterpoint with itself, beginning at different time points—occurs prevalently in fugues by J. S. Bach and other baroque composers. This study investigates the formal function of stretto using a corpus analysis of Bach's use of stretto in the forty-eight fugues of the *Well-Tempered Clavier*. It documents details regarding each instance of stretto within the corpus and explores connections between these data using graphs and statistical tests, generally as well as in investigation of three specific hypotheses. The *conclusion*, *density*, and *quantity* hypotheses predict that there will be more stretto passages, time-intervals between onsets of adjacent entries in stretto passages will become smaller, and there will be more entries per stretto passage towards the end of the composition. The results do not provide strong evidence supporting any of these hypotheses, and they directly contradict the expectations of the *density* hypothesis.

Keywords

J. S. Bach, stretto, music theory, music analysis, fugue, counterpoint, formal function, corpus studies, initial stretto articulation, *The Well-Tempered Clavier*

Summary for Lay Audience

Stretto is a compositional technique of using a fugue subject in counterpoint with itself, beginning at different time points, similar to how two voices in a musical round or a canon enter with the same melody at different times. This technique occurs prevalently in fugues by Baroque composers, including those of J.S. Bach. The Well-Tempered Clavier is made up of two volumes of preludes and fugues, with one prelude and fugue set in each major and minor key in each book. The complete set of forty-eight preludes and fugues is an important collection of works within J.S. Bach's output, within the study of Baroque counterpoint, and within the repertoire of pianists. This study investigates how elements of stretto relate to location within the fugue across all forty-eight fugues in the Well-Tempered Clavier. It documents details regarding each instance of stretto within the corpus and explores connections between these data using graphs and statistical tests. In addition to a general inquiry, three specific hypotheses are explored: the conclusion, density, and quantity hypotheses. All three of these hypotheses are based on the idea, prevalent in the scholarship, that stretto will occur primarily near the end of fugues, entries in stretto will get closer together (smaller gaps between entries produce more overlap of entries) and function as a technique to build toward a climactic conclusion. The results do not provide strong evidence supporting any of these hypotheses, and they directly contradict the expectations of the density hypothesis, showing that our understanding of stretto is not as simple as the literature implies.

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Chapter 1

Overview and Literature Review

Stretto—the technique of using a fugue subject in counterpoint with itself—occurs prevalently in fugues by J. S. Bach and other Baroque composers, as well as in fugues from other eras. Despite its prevalence, stretto's formal function within fugal composition remains under-theorized in the scholarly literature. This study examines occurrences of stretto in the fugues of *The Well-Tempered Clavier* (*WTC)* in an investigation of where and how stretto is used within this collection.[1] This thesis introduces a new method and lays groundwork for potential future studies with a larger or different corpus.

With the aim of providing an overview of stretto, this chapter is divided into four sections. Section 1.1 covers definitions of stretto from a variety of sources. Section 1.2 covers the formal analysis of fugues, building from the dictionary, encyclopedia, and counterpoint textbook definitions of stretto into music-theoretical discussions of formal function and fugues. Then more recent scholarship is incorporated in Section 1.3, including discussion of corpus analysis. Finally, Section 1.4 will establish the questions that the remaining chapters will address.

This thesis is intended as a music-theoretical account of stretto in the forty-eight fugues of the *WTC*. It will challenge existing assumptions about fugues and stretto and pose questions for further inquiry into the function of stretto and form within fugues. Although the corpus of this study is narrow, limiting the generalizability of the findings, it poses a framework and background for possible future scholarship into more diverse repertoires. Within this study, I focus on how the frequency and density of stretto changes towards the end of the fugue, as well as locating where stretto begins within a fugue and factors related to that.

[1] All forty-eight fugues that are marked as fugues are included. Any preludes which use fugal techniques are not included.

1.1 Stretto definitions

> stretto [It.]
>
> Drawn together.
>
> 1. Quicker tempo. 2. In fugue: when entry of the answer occurs before subject is completed, overlapping with it. Often a way of increasing excitement.[2]

This is the definition of stretto from the most recent edition of *The Oxford Dictionary of Music*. *Grove Music Online* also has two entries for the word stretto, where "Stretto (i)" refers to stretto in fugues and "Stretto (ii)" refers to the term used "to indicate a faster tempo at the climactic concluding section of a piece."[3] The article "Stretto (i)" by Paul M. Walker begins by describing stretto in fugue as

> the procedure of beginning a second statement of the subject before the preceding statement has finished, so that the two overlap (in German the technique is known as *Engführung*). The value of this technique for fugal composition has been recognized since the mid-17th century, when musicians including G.M. Bononcini and Reincken began to advocate its use near the end of a piece as a means of increasing excitement and intensity and thus leading the piece towards a suitable close. Reincken noted further that the composer should feel free to take greater liberties with the subject when composing stretto entries. The Fugue d'école prescribes stretto as a necessary component, but outside that context the technique is by no means always present in a fugue.[4]

Both these sources comment on the function of stretto, and agree that it is related to increasing excitement. The *Grove Music Online* article also articulates the normative location for stretto being near the end of the fugue, and dates the discussion of stretto's location and function back to the seventeenth century. These concepts, that stretto primarily occurs approaching the

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[2] Michael Kennedy and Joyce Bourne, "Stretto," in *Oxford Dictionary of Music* (Oxford University Press, 2013), https://www.oxfordreference.com/view/10.1093/acref/9780199578108.001.0001/acref-9780199578108-e-8772.

[3] Roger Bullivant, "Stretto (ii)," in *Grove Music Online* (Oxford University Press, 2001), https://www.oxfordmusiconline.com/grovemusic/view/10.1093/gmo/9781561592630.001.0001/omo-9781561592630-e-0000053899.

[4] Paul M. Walker, "Stretto (i)," in *Grove Music Online* (Oxford University Press, 2001), https://www.oxfordmusiconline.com/grovemusic/view/10.1093/gmo/9781561592630.001.0001/omo-9781561592630-e-0000026948.

conclusion of a fugue and functions to build towards a climactic ending, are prevalent in discussion of stretto, and have been for quite some time.[5]

The other meaning of the term stretto given by the *Oxford Dictionary of English* definition at the beginning of this section, the meaning that does not directly pertain to fugues, refers to tempo. The *Grove Music Online* article which discusses this definition of stretto, "Stretto (ii)," begins with a statement that "The term is sometimes used, interchangeably with 'stretta', to indicate a faster tempo at the climactic concluding section of a piece; such sections are often headed 'stretto' or 'stretta'."[6] This "increased speed" definition of stretto relates to the definitions of stretto in fugue by connecting this tempo variation to function and location. In both *Grove Music* articles on stretto, there are descriptions of stretto being used in concluding sections of compositions (location) in order to produce an exciting, climactic conclusion (function). In fugues, this exciting climax is achieved by overlapping subject entries; in the alternate definition, it is used by increasing tempo. Both operate by decreasing time between onsets: in the case of fugues, between the onsets of subsequent entries; in the case of speed, between the onsets of individual notes. In the first scenario, the entries are getting closer together with increased voice overlap; in the second scenario, notes are getting closer together because they become shorter as speed increases.

It is valuable to look at discussions of stretto in counterpoint textbooks as well as dictionaries and encyclopedias. Many musicians, including music theorists, learn about stretto via a counterpoint textbook, and definitions of stretto within counterpoint textbooks cover a range of complexity. On the one hand, Harold Owen provides a simple definition of stretto as "the overlapping of subject entries."[7] On the other hand, Kent Kennan offers a more detailed definition:

> In fugues, the subject is often treated in a canonic fashion for short periods to form a stretto. A stretto is a passage in which the musical idea in one voice is overlapped by the

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[5] Kennedy and Bourne, "Stretto"; Walker, "Stretto (i)"; Henry Martin, *Counterpoint: A Species Approach Based on Schenker's Counterpoint* (Lanham, Maryland: The Scarecrow Press, 2005), 118; Thomas Benjamin, *The Craft of Tonal Counterpoint*, 2nd ed. (New York: Routledge, 2003), 223–26.
[6] Bullivant, "Stretto (ii)."
[7] Harold Owen, *Modal and Tonal Counterpoint: From Josquin to Stravinsky* (New York; Toronto; Schirmer Books, 1992), 368.

> same idea—or, rarely, by a different one—in another voice. The word *stretto* means "tight" in Italian and is applied to this arrangement because the statements are being pulled tightly together instead of being spread out consistently.[8]

Thomas Benjamin goes even further in his definition of stretto by including the effect it creates and its typical location within a fugue. With respect to its effect, he describes stretto as "a common device for building tension in an imitative work," and concerning location, he discusses the notion of a stretto fugue, in which "stretto entrances near the end may be at closer time-intervals, to increase tension and drive."[9] These ideas are echoed by Peter Schubert and Christoph Neidhöfer in a chapter devoted to stretto in their counterpoint textbook:

> Stretto means "squeezed" in Italian. In a stretto the imitative entries are squeezed together in time, each one seeming to enter before the previous one has ended. The effect is of greater intensity, as if the voices were rushing into interrupt each other. Composers often save it for the end of the piece, although there exists a category of fugues called *stretto fugues*, where the entries are in close time-intervals from the very beginning.[10]

These definitions describe technically what a stretto is, and they also touch on the effect it creates and some of its typical locations within a fugue. *How* stretto is used is incorporated into *what* stretto is; the role, or function, that stretto plays within fugues, is woven into these definitions. Despite this strong consensus, however, there is not much evidence given to support these claims. For example, these descriptions do not go into detail regarding the function of stretto within the overall form of a fugue, nor the *full range* of locations—apart from the typical locations—within which such functions can operate. In an effort to understand better the function of stretto and the range of locations it can occupy within the context of an entire fugue, this study

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[8] Kent Kennan, *Counterpoint: Based on Eighteenth-Century Practice*, 4th ed. (Upper Saddle River, NJ: Prentice Hall, 1999), 99. Kennan is an outlier in suggesting that one voice being overlapped by another voice, but using a different melody, could count as an instance of stretto. I discount this notion based on the descriptions of other sources, including Walker, "Stretto (i)"; Knud Jeppesen, *Counterpoint: The Polyphonic Vocal Style of the Sixteenth Century*, trans. Glen Haydon (Englewood Cliffs: Prentice-Hall, 1939), 167; Benjamin, *The Craft of Tonal Counterpoint*, 223–27; Peter Schubert and Christoph Neidhöfer, *Baroque Counterpoint* (Upper Saddle River, NJ: Pearson Prentice Hall, 2006), 327–40.

[9] Benjamin, *The Craft of Tonal Counterpoint*, 293.

[10] Peter Schubert and Christoph Neidhöfer, *Baroque Counterpoint* (Upper Saddle River, NJ: Pearson Prentice Hall, 2006), 327–28.

will explore the use of stretto throughout the *WTC* to test whether or not it conforms to the definitions of stretto provided thus far.

Although the preceding discussions regarding stretto are written fairly generally regarding stretto, there is evidence that the ideas are applicable to the fugues of J.S. Bach specifically. Thomas Benjamin's textbook *The Craft of Tonal Counterpoint*, for example, was titled *Counterpoint in the Style of J. S. Bach* in its preceding edition, and in the Preface to the Second Edition he makes it clear that the focus is specifically on the work of J. S. Bach.[11] When stretto is discussed, the musical examples for demonstration and analysis are all by Bach. Based on the context, including instructions to note how the given examples (by Bach) function in this way, it is clear that Benjamin has Bach's fugues in mind when he says that

> Stretto is an effect often reserved for the latter sections of a fugue, because of its intensifying, climactic effect. It can work especially well in combination with dominant pedal to create tension near the end. The closer stretto intervals are usually reserved for these final, climactic sections.[12]

Other authors are broader in their approach, looking at music beyond that by Bach, but most of them include examples by Bach when they include specific examples of the concepts that they describe. For example, Schubert and Neidhöfer deliberately base their textbook on a wide range of composers, stating that "it is important to know what the 'run-of-the-mill' is in a given period before approaching the truly great",[13] and yet when stretto is addressed in Chapter 18, almost all of the examples used are from the *WTC* by J. S. Bach.[14]

For the purposes of this study, a stretto passage is defined as a passage with continually overlapping subject entries. The first and last entries within a stretto passage must overlap at one end—either the head or tail of a subject—and the middle entries must overlap at both ends (the head *and* the tail), with the overlap being larger than one beat. Outside of stretto passages, it is fairly common for the last note of a subject entry to align with the first note of the next subject entry; however, that is considered elision and not stretto. The definition that I am employing for

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[11] Benjamin, *The Craft of Tonal Counterpoint*, xi.
[12] Benjamin, *The Craft of Tonal Counterpoint*, 225.
[13] Schubert and Neidhöfer, *Baroque Counterpoint*, 4.
[14] Schubert and Neidhöfer, *Baroque Counterpoint*, 327-340.

stretto specifies the overlap of more than one beat in order to separate the techniques of elision and stretto while also being maximally precise to allow for increased clarity of findings.

Fugues that are permeated with stretto are often called "stretto fugues." Although these fugues have stretto throughout, not just towards the end, they are still expected to conform to the expectations that stretto will become denser later in the composition and increase tension and drive towards a weighty climax.[15] In the "Stretto" chapter of *Baroque Counterpoint*, Peter Schubert and Christoph Neidhöfer describe two meanings of *stretto fugue*, both of which incorporate stretto through the bulk of the composition. The first meaning pertains to fugues that "begin with a very short time interval of imitation right away from the outset, like the C# major fugue in WTC II" [16] In these fugues, stretto cannot be the only climactic technique, since it is so pervasive, although stretto can still serve as a climactic device by using shorter time-intervals or less usual pitch-intervals. The other meaning "applies to fugues that have no episodes and use various short time intervals of imitation instead. The C major fugue from WTC I has no countersubject (i.e., it's a simple fugue) and it contains no episodes at all, but many different stretti."[17] Although this study does not directly account for the classification of stretto fugues, it is important to acknowledge this distinction between stretto fugues and other fugues that use stretto. These definitions of stretto fugues maintain the function of stretto as being to increase tension and excitement towards a climactic ending, and also add further ways of building this climax in a stretto fugue, including stretto being used at more exotic pitch-intervals. It is implied that when stretto begins near the beginning of a fugue, it will be a key feature of the composition and permeate throughout the form. Whether a fugue is identified as a stretto fugue or not, the expectation remains consistent that stretto is being used to build towards a climactic conclusion.

1.2 Form and fugues

Formal function is often discussed in the context of music from the classical era. In *Analyzing Classical Form*, William Caplin states that "the concept of *formal function* is central to the theory and analysis of classical form" and that ". . . most fundamentally, formal functionality relates to some general notions of time. In many situations in our life, we can experience the

[15] Benjamin, *The Craft of Tonal Counterpoint*, 293.
[16] Schubert and Neidhöfer, *Baroque Counterpoint*, 338.
[17] Ibid.

sense of *beginning* something, of *being in the middle* of something, or of *ending* something."[18] In Caplin's work, the distinction between initiating, medial, and concluding functions is important; however, it is not immediately obvious how it can be translated retroactively from Classical repertoire to Baroque fugues. Fugues can also be formalized in terms of beginning, middle, and end, although form in fugue is less established and definite than it is in classical-period forms such as sonata form. The beginning, called the exposition, is the most clearly defined section, with staggered entries in all of the voices. The middle has middle entries, where the subject returns, and episodes, which have contrasting material. The middle also generally modulates to other keys (although not always), while the ending brings closure in the home key.

Fugal form is often described as variable, with many possible ways to assemble the compositional elements beyond the fairly standardized exposition.[19] Benjamin emphasizes the loosely defined formulation of fugal form when he states that "All we can accurately say about the plan of a Bach fugue is that there will be an exposition, followed by episodes and/or middle entries and/or strettos and/or other manipulations of the main thematic material, modulating through two or more closely related keys, and returning to the tonic key."[20] In tonal fugues, modulations and cadences are described as demarcating form within individual fugues, along with texture, register, subject entrances, and devices such as pedal point, inversion, or stretto.[21]

Attempts to explain the formal function and location of stretto have been made by some theorists, including Imogene Horsley and David A. Sheldon. According to Horsley, stretto was considered "an essential part of the fugue form" by the late-eighteenth and early-nineteenth centuries.[22] Sheldon also uses the word "essential" in his discussion of stretto and form, although he is referring to a broader "stretto principle":

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[18] William E. Caplin, *Analyzing Classical Form: An Approach for the Classroom* (New York: Oxford University Press, 2013), 47.
[19] Imogene Horsley, *Fugue, History and Practice* (New York: Free Press, 1966), 186; Schubert and Neidhöfer, *Baroque Counterpoint*, 350; Benjamin, *The Craft of Tonal Counterpoint*, 211–12.
[20] Benjamin, *The Craft of Tonal Counterpoint*, 211.
[21] Horsley, *Fugue*, 242; Benjamin, *The Craft of Tonal Counterpoint*, 211; Schubert and Neidhöfer, *Baroque Counterpoint*, 350–52.
[22] Horsley, *Fugue*, 272.

> The developmental motion seems to be from the most simple and obvious to the most complex, at times in an almost accelerative fashion. Of all the compositional techniques associated with the fugal process, stretto seems to represent most clearly these two interrelated ideas of continuity and cumulation. For this reason, therefore, both might be termed collectively "the stretto principle," and regarded as the essential formal characteristic of the fugal process overall."[23]

Where previous definitions have described stretto as a technique to increase tension and drive towards a climactic ending, Sheldon describes more broadly that the characteristics of accelerating from simple to complex and ending in an exciting, climatic way is a common goal for fugues. His "stretto principle" is a combination of continuity and cumulation which is described as an essential element of fugues. In this article, he contrasts continuity and cumulation in music with sectional or cyclic approaches to composition. Sheldon describes the principles of clarity, unity, and continuity as common in the arts in the seventeenth and eighteenth centuries, and how musical forms based on these principles could be expected "to show a gradual realization of the potential of mainly one subject, rather than an ordering brought about by sudden change, thematic contrast, and sectional repetition," and that in practice, "the fugal process is cumulative, the result of the almost continuous exploration of the thematic material's manipulative potential."[24] This principle is named for stretto since stretto not only has this effect, but is a clear way of creating the continuity and cumulation which is seen as key to the fugal process.

Horsley's discussion about the importance of stretto in fugue form is primarily associated with repertoire from the Classical and Romantic periods. In her discussion of fugal theory in this later period, she writes the following:

> Elements that were not yet fixed—the structure of episodes, the exact placement of such devices as stretto, and the best order of modulation—were naturally not yet subject to theoretical pronouncements. Theorists of the late eighteenth century succeeded in fixing

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[23] David A. Sheldon, "The Stretto Principle: Some Thoughts on Fugue as Form," *The Journal of Musicology* 8, no. 4 (1990): 566–68.
[24] David A. Sheldon, "The Stretto Principle: Some Thoughts on Fugue as Form," *The Journal of Musicology* 8, no. 4 (1990): 566.

> the place of the stretto, but fixed forms for the fugue were not formulated until the second quarter of the nineteenth century when fugue writing became a part of the conservatory curriculum.[25]

She also writes, in her discussion of form in fugues of the Classical and Romantic periods, about the conventionalization of the form and placement of stretto in fugues, providing evidence that there were not yet conventions for the use of stretto when J. S. Bach was writing *The Well-Tempered Clavier*.[26] This conventionalization of stretto towards the way that we typically think about it in modern discourse could have been standardizing something that was already known and in use, or it could have been reacting against a different way of using stretto. It is possible that modern textbooks have anachronistically adopted this conservatory fugue convention to the earlier fugues of the Baroque period, giving a less than completely accurate description of Bach's fugal writing.[27]

In his article, Sheldon presents evidence from earlier scholars that stretto serves as a "preparation for closure," signaling the conclusion of a fugue.[28] He presents evidence from seventeenth- and eighteenth-century theorists, including Wilhelm Marpurg and Johann Mattheson, to back his argument that stretto is primarily associated with the end of a fugue. Based on the idea that "it is by means of momentum and energy that a fugue closes, not recapitulation and repose," as well as the ability of stretto to generate momentum and energy as entries come closer and closer together, the conclusion is that stretto passages will generally be clustered towards the end of a fugue.[29]

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[25] Horsley, *Fugue, History and Practice*, 262.

[26] Ibid., 272.

[27] "There has developed, beginning in the mid-17th century, a theoretical, textbook model for fugue, often associated with Fux's *Gradus ad Parnassum* and . . . with the teaching of the Paris Conservatoire. The appropriateness of this model as a standard, and of its characteristics as necessary and sufficient for the genre, has been a topic of considerable debate." (Paul M. Walker, "Fugue," in *Grove Music Online* (Oxford University Press, 2001), https://www.oxfordmusiconline.com/grovemusic/view/10.1093/gmo/9781561592630.001.0001/omo-9781561592630-e-0000051678.). The model developed in the Paris Conservatoire is often called the *fugue d'école*, or the school fugue, and it was intended more as an exercise for student composers than a guide to fugues of the past (Paul M. Walker, "Fugue d'école," in *Grove Music Online* (Oxford University Press, 2001), https://www.oxfordmusiconline.com/grovemusic/view/10.1093/gmo/9781561592630.001.0001/ omo9781561592630-e-0000051714).

[28] Sheldon, "The Stretto Principle: Some Thoughts on Fugue as Form," 554.

[29] Ibid., 566.

Wilhelm Marpurg associates stretto with the end of a fugue, although he does not prohibit the use of stretto earlier in the fugue.[30] For example, in relation to a fugue's final return to the home key, Marpurg writes that "the original key should be approached again with a carefully arranged modulation, using the complete or abbreviated theme in different forms of periodic and canonic imitation."[31] In *Der vollkommene Capellmeister*, originally published in 1739, Johann Mattheson instructs that a fugue subject should be written such "that it would allow the entrance of the consequent before it reaches its end" (in other words, a fugue subject should be able to be used in stretto), and that a full fugue should be constructed in such a way that "the subjects can gradually come closer to each other."[32] The subjects entering closer together means that stretto would occur later in the piece, and that in cases where there are multiple stretto passages, the later ones would have shorter time-intervals between successive entrances.

When Sheldon uses these theorists' accounts in his argument, he concedes that he is looking at the history of musical thought more than the practice itself, and that the analysis of fugues does not always agree with these assertions.[33] To be sure, stretto does provide a means of foreshadowing closure in some fugues. One such example is J. S. Bach's Fugue in B♭ Minor, from Book I of the *WTC*, BWV 867. This is not the case for all fugues in the *WTC*, however. For instance, the Fugue in F Major from Book I, BWV 856, features stretto a third of the way into the piece and uses it throughout the middle of the fugue. The Fugue in D Major from Book II, BWV 874, showcases stretto at the beginning of the piece, initiating a stretto fugue. These three pieces alone demonstrate that stretto plays a more multifaceted role within fugues than Sheldon contends, thus providing the rationale for pursuing the research goals of this thesis.

Sheldon initiates research for examining the function of stretto by including a statistical study in his article that looks at "the frequency distribution of complete subject and answer statements"

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[30] Ibid., 557.

[31] Friedrich Wilhelm Marpurg. *Abhandlung von der Fuge.* Berlin: A. Haude & J.C. Spencer, 1753-54; partially translated in *The Study of Fugue*, trans. Alfred Mann. New York: W.W. Norton and Co., 1965, 180.

[32] Johann Mattheson and Ernest Charles Harriss, *Johann Mattheson's Der Vollkommene Capellmeister: A Revised Translation with Critical Commentary*, vol. no. 21 (Ann Arbor, Mich: UMI Research Press, 1981), 128–29.

[33] Sheldon, "The Stretto Principle: Some Thoughts on Fugue as Form," 560.

within both books of the *WTC*.[34] With these data, he describes the distribution of thematic material (i.e., subjects and answers) as being fairly even throughout the progression of each fugue, with longer episodes (without the subject) balancing out sections with more thematic material (denser clusters of subject entries) in the latter part of the fugues. The presence of stretto is implied by these dense clusters of entries; however, Sheldon does not investigate these clusters beyond this point within his article. This current study will look more closely at the clusters that are dense enough to result in stretto.

1.3 Recent research and corpus analysis in music theory

There is also more recent research that touches upon aspects of stretto or techniques associated with it, such as imitative counterpoint. For instance, Ellen Bakulina investigates the role of imitative counterpoint as a form-defining factor in Classical-style compositions.[35] Additionally, Steven Rings looks at stretto passages in his 2011 book, *Tonality and Transformation*, although he only describes one fugue and goes into a deeper, transformational-style analysis of that fugue.[36] Despite both of these being contributions to the study of imitative counterpoint and stretto, neither delves into the formal function of stretto in fugues.

A form of music scholarship that has received considerable attention in recent years is corpus analysis. Between 2013 and 2016, the journal *Music Perception* published two special issues on corpus analysis, and *Empirical Musicology Review* also published two special issues on the topic.[37] The term "corpus analysis" refers to a broad range of methods for scholarship that use statistical methods in order to investigate repertoires and collections of music as a whole, zooming out to look at large patterns instead of zooming in to investigate individual works. Methods of corpus studies are used in other fields in the humanities as well, such as linguistics, and because of their statistical content they also overlap with methods used in the social sciences, such as psychology. Although much about methodology in corpus research depends on the

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[34] Ibid., 564.

[35] Olga Bakulina, "The Loosening Role of Polyphony: Texture and Formal Functions in Mozart's 'Haydn' Quartets," *Intersections: Canadian Journal of Music/Intersections: Revue Canadienne de Musique* 32, no. 1–2 (2012): 7–42.

[36] Steven Rings, *Tonality and Transformation* (New York; Oxford: Oxford University Press, 2011), 151–69.

[37] *Music Perception*, Volume 31, issues 1 and 3. *Empirical Musicology Review*, Volume 11, issues 1 and 2.

specific purpose of the study, David Temperley and Leah VanHandel make a few general points in their introduction to the first *Music Perception* special issue:

> Creation of the corpus—unless an existing one can be used—is often a major and labor-intensive undertaking, raising significant issues and problems. One must decide what kind of information the corpus will represent and how it will be represented. In some cases, the kind of information needed can be extracted from scores in an objective way (for example, pitches or rhythmic values); in other cases, a significant amount of interpretation is involved (such as harmonic analysis or identification of phrase boundaries). If the focus of the study is on phenomena of composition, standard statistical techniques can be used to determine whether a pattern observed in a sample of pieces can reliably be generalized to the larger population under investigation. It is important to decide exactly what that "larger population" is—the music of a single composer, a specific compositional school or style, or a broader musical idiom (e.g., "common-practice Western music")—and to sample it appropriately.[38]

The "larger population" of this current study could be considered limited compared to the examples given by Temperley and VanHandel. This "larger population" is one set of works by one composer, not all fugues by J. S. Bach or from the baroque period but the forty-eight fugues Bach wrote and published under the title *The Well-Tempered Clavier*. If these two volumes are considered a single work, or each volume is considered an individual work, it is only one or two works and only half of the compositions within them are acknowledged (since the compositions labelled as preludes are not included). I believe, however, that the *WTC* is better considered as forty-eight separate works contained within two volumes. Each Prelude and Fugue pairing is a self-contained unit that is presented as a whole. The *WTC* also has a few characteristics which lend it to treating it as the corpus for this experiment. First, it is well-balanced, with exactly two fugues occurring in each major and minor key, meaning that results will not be influenced by any compositional differences between keys.[39] Second, the composition of the fugues occurred over a

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[38] David Temperley and Leigh VanHandel, "Introduction to the Special Issues on Corpus Methods," *Music Perception: An Interdisciplinary Journal* 31, no. 1 (2013), 2.

[39] This modally-balanced nature of the *WTC* is cited as a reason why Matthew Poon and Michael Schutz used these compositions in their corpus analysis "Cueing Musical Emotions: An empirical analysis of 24-

wide portion of Bach's career, with the first volume published about twenty years before the second volume, which accounts for possible differences in compositional style in different times across his career. Finally, this is a pivotal work that much current pedagogy related to fugues is based on, with Bach being considered a master of fugue and the *WTC* being one of his most famous works, which increases the population who will be interested in the findings.

Corpus studies can ask different kinds of questions than traditional single-work analysis, and these forms of studying music can complement each other as they have different strengths. Looking at elements across various corpora finds elements of continuity and identifies norms, while single-work analysis can highlight unique quirks of specific pieces. Elements that are found in one or two pieces individually could inspire a corpus study investigating how common or uncommon those elements are in a certain body of music. When a corpus study, like this one, find trends across repertoires, the individual works can be examined in light of how their traits compare to the average.

1.4 Hypotheses

The theoretical idea that stretto builds towards the end of a fugue and serves as preparation for closure seems to be taken as common knowledge, although it has not been empirically supported. This study aims to begin this verification by testing three hypotheses on the fugues of J.S. Bach's *WTC*. These hypotheses are based on the literature discussed in the previous sections; they are the *conclusion*, *density*, and *quantity* hypotheses and are defined as follows:

1. stretto becomes more frequent towards the end of a fugue, with more stretto passages in the final sections of the composition (the *conclusion hypothesis*);[40]
2. time-intervals between onsets of adjacent entries within stretto passages become smaller towards the end of a fugue (the *density hypothesis*);[41]

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piece sets by Bach and Chopin documents parallels with emotional speech," *Frontiers in Psychology*, November 2 2015, https://link.gale.com/apps/doc/A448814513/AONE?u=lond95336&sid=AONE&xid=5bdd5fa1.

[40] Walker, "Stretto (i)"; Schubert and Neidhöfer, *Baroque Counterpoint*, 327–28; Mattheson and Harriss, *Der Vollkommene Capellmeister*, no. 21:128–29.

[41] Benjamin, *The Craft of Tonal Counterpoint*, 293; Mattheson and Harriss, *Der Vollkommene Capellmeister*, no. 21:128–29; Sheldon, "The Stretto Principle," 564.

3. the number of entries per stretto passage becomes higher towards the end of a fugue (the *quantity hypothesis*).[42]

In addition to testing these hypotheses, this thesis will investigate other possible connections between the location within the fugue that a stretto passage appears and other parameters regarding the use of stretto. I will use correlations and graphs to explore the following parameters: pitch-intervals between successive subject entries, the local and global scale degrees that initiate stretto entries and/or passages, cadences, and subject content (in the form of paradigms defined by William Renwick[43]). I will also use Renwick's subject paradigms as a means of comparison between fugues that have stretto with those that don't have stretto within the *WTC*, as an inquiry into whether a Schenkerian-style analysis of a fugue's subject can predict whether or not Bach will use that subject in stretto.

The next chapter, Chapter 2, consists of a detailed explanation of my methodology for testing these three hypotheses, including explanations of all the criteria and values that appear within the tables of data that form the foundation of this study. The tables themselves are included in the appendices. The results of this study are then synthesized in Chapter 3, which focuses on empirical data, including results from statistical tests run and discussion of particular data from the tables. Finally, Chapter 4 concludes this thesis by reconciling the results illustrated in Chapter 3 with the previous scholarship from Chapter 1 and proposing targets for further investigation.

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[42] Stretto is commonly associated with the end of a fugue (Kennedy and Bourne, "Stretto"; Walker, "Stretto (i)"; Martin, *Counterpoint*, 118; Benjamin, *The Craft of Tonal Counterpoint*, 223-26) which could mean that stretto entries or stretto passages become more frequent in this section. The conclusion hypothesis addresses the passages component, which is more explicitly predicted by the literature, and the quantity hypothesis expands on the notions of stretto becoming more frequent and denser towards the end by looking specifically at stretto entries. Therefore, the quantity hypothesis is inferred from the conclusion and density hypotheses as well as general discussions of stretto.

[43] William Renwick, *Analyzing Fugue: A Schenkerian Approach* (Stuyvesant, NY: Pendragon Press, 1995).

Chapter 2

2 Fugue Subjects, Stretto Tables, and Statistical Methods

In this study, I investigate the formal role of stretto by studying all instances of it within *The Well-Tempered Clavier* (*WTC*). The first step involves identifying how often stretto occurs in the corpus and which fugues it occurs in. This is done by identifying subjects and searching for any instances where they recur, and then identifying overlapping subject entries as stretto. The results appear in Table 22 in Appendix B, with a column for each of the forty-eight fugues and containing information about all the fugues in the corpus, regardless of whether they use stretto or not. Additionally, each fugue containing stretto is given its own table that contains information pertaining to the stretto entries in that fugue. These tables are included as Tables 1-21 in Appendix A, and from here on will be referred to as "stretto tables." This chapter is divided into three sections and is organized as follows: Section 2.1 will discuss Table 22 along with the analysis of fugal subjects, Section 2.2 will describe the characteristics included in the individual stretto tables (Tables 1-21), and Section 2.3 will explain the statistical methods used in this study.

2.1 Fugue subjects and complete fugues

Information concerning all forty-eight fugues, regardless of whether or not they contain stretto, is contained in Table 22 in Appendix B. This is a large table, as there are forty-eight columns to account for all forty-eight fugues. To make the table more manageable, it is divided into seven smaller tables labelled from Table 22a to Table 22g. This table contains the following details as they pertain to each of the forty-eight fugues: location in the *WTC* (Book I or II); key; meter; number of voices; fugal-answer type (real or tonal) within the exposition; subject paradigm[44]; number of stretto passages; and total number of measures. The number of stretto passages ranges from zero (for those fugues which do not use stretto) to eleven (for the Fugue in A Minor from Book I of the *WTC*, which has the most stretto passages). The key, meter, and number of voices are taken from the identification of the fugue, and the total number of measures is an objective measure count. The subject of each fugue is analyzed and used to determine whether the answer

[44] William Renwick, "Structural Patterns in Fugue Subjects and Fugal Expositions," *Music Theory Spectrum* 13, no. 2 (1991): 197–218, https://doi.org/10.2307/745898; Renwick, *Analyzing Fugue*.

is real or tonal, how many stretto passages (if any) occur throughout the fugue, and the identity of the subject paradigm (according to the paradigms outlined by William Renwick in his book *Analyzing Fugue*).[45] Some fugue subjects are more conducive to being used in stretto than other fugue subjects, and, as such, discussion of the melodic composition of subjects is beneficial for understanding stretto.

2.1.1 Fugue subjects and paradigms

Fugue subjects are central to discussions of fugue form. The exposition is made up of subject entries that articulate fugue subjects in each musical voice (e.g., soprano, alto, and bass). The rest of the fugue (after the exposition) is typically analyzed as being one of two kinds of sections: ones that include subject entries (middle entries) and ones that do not (episodes).[46] Daniel Harrison claims "that fugue subjects *per se* should be the chief object of analytic interest, and that a satisfactory reading of a fugue can result from a focus on the subject alone."[47] Although this study does not primarily aim to analyze subjects, characteristics of subjects determine which contrapuntal techniques, including stretto, could be utilized in a fugue built from that subject. Indeed, Carl Philipp Emanuel Bach, in reference to his father listening to a fugue, writes that "he [J. S. Bach] could say, after the first entries of the subject, what contrapuntal devices it would be possible to apply, and which of them the composer by rights ought to apply."[48] Investigating similarities and differences between subjects that are used in stretto and those that are not could prove interesting and pose questions for further investigation.

Although this study does not delve deeply into the intricacies of fugal subjects, it classifies subjects following William Renwick, who uses a Schenkerian approach to group fugue subjects into discrete *paradigms*.[49] Each paradigm is a linear progression showing the primary scale degrees used in the subject. For example, paradigm 1 is $\hat{5}$-$\hat{4}$-$\hat{3}$ and is the most common paradigm

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[45] Renwick, *Analyzing Fugue*.
[46] Benjamin, *The Craft of Tonal Counterpoint*, 211.
[47] Daniel Harrison, "Heads and Tails: Subject Play in Bach's Fugues.," *Music Theory Spectrum* 30, no. 1 (2008): 161.
[48] Werner Neumann and Hans-Joachim Schulze, eds., *Bach-Dokumente*, vol. 3 (Leipzig, 1972), 801; Hans T. David and Arthur Mendel, eds., *Bach Reader*, 2nd rev. ed. (New York: Norton, 1966), 277.
[49] Renwick, "Structural Patterns in Fugue"; Renwick, *Analyzing Fugue*.

used by Bach in the *WTC*.[50] Renwick's 1991 *Music Theory Spectrum* article "Structural Patterns in Fugue Subjects and Fugal Expositions" outlines six paradigms, which account for forty-two of the forty-eight fugues in Bach's *Well-Tempered Clavier*.[51] His 1995 book, *Analyzing Fugue*, outlines thirty paradigms which renumber and expand upon the six paradigms described in the earlier article. Additionally, whereas the article defines paradigms for only non-modulating subjects, the book introduces a harmonic aspect—what Renwick terms a *category*—for cataloguing fugue subjects (in addition to the linear aspects of paradigms) that also embraces modulating and tonally-open fugue subjects. There are three such categories, as follows: Category 1 involves non-modulating subjects that end on I, Category 2 describes modulating subjects that end on V, and Category 3 pertains to non-modulating subjects that end on V.[52] The only paradigm number which stays constant between the article and the book is Paradigm 1, which outlines $\hat{5}$-$\hat{4}$-$\hat{3}$, with Paradigms 2 ($\hat{1}$-$\hat{2}$-$\hat{3}$), 3 ($\hat{5}$-$\hat{4}$-$\hat{3}$-$\hat{2}$-$\hat{1}$), 4 ($\hat{3}$-$\hat{2}$-$\hat{1}$), 5 ($\hat{1}$-$\hat{2}$-$\hat{3}$-$\hat{4}$-$\hat{5}$), and 6 ($\hat{5}$-$\hat{6}$-$\hat{7}$-$\hat{8}$) from the article matching with Paradigms 5, 2a, 2, 13, and 3a from the book, respectively.[53]

In this study, I will use the paradigm classifications from *Analyzing Fugue* along with the linear progressions that Renwick analyses for the fugue subjects in the *WTC* that do not contain stretto. While his 1995 book contains a more exhaustive inventory of subject paradigms, it does not include his analysis of the paradigms for all of the fugues in the *WTC*. His 1991 article does, however, include a table listing the fugues of the *WTC* according to the paradigms that he analyzed to be used by their subjects. Six of the Book I fugues do not fit the original six paradigms and are not included in the article's table; they are discussed in the later book, and I have incorporated the analyses from there.

Since two of the stretto-containing fugues utilize a second subject in their stretto passages, and these second subjects are not analyzed by Renwick in these publications, I have used my own analyses for all of the stretto-containing fugues (these two as well as the others for which Renwick has published paradigms). Of the nineteen fugues that utilize the original subject in stretto, my analysis of the linear progression is the same as Renwick's for seventeen of them.

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[50] Renwick, "Structural Patterns in Fugue," 198; Renwick, *Analyzing Fugue*, 75.
[51] Renwick, "Structural Patterns in Fugue," 198.
[52] Renwick, *Analyzing Fugue*, 24–25.
[53] Renwick, "Structural Patterns in Fugue," 198; Renwick, *Analyzing Fugue*, 77.

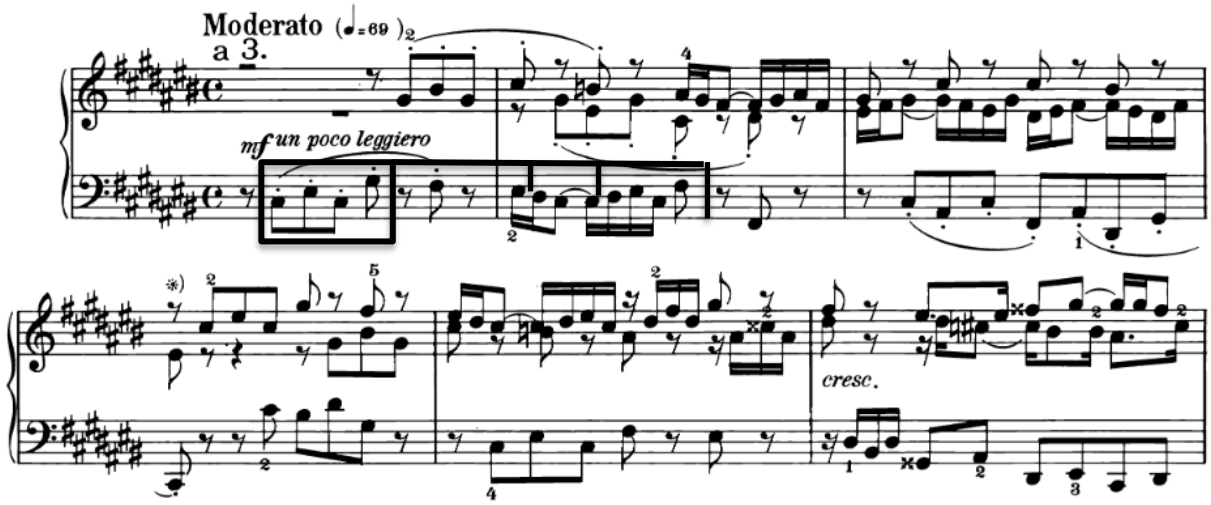
The two fugues with subjects that I analyze differently than Renwick are the Fugue in G Major (BWV 860) and the Fugue in A Major (BWV 864) from Book I, and in both cases it appears that I am analyzing a slightly longer subject than Renwick.

Another element of fugue subject analysis that is important for investigation of stretto is subject length. Since stretto involves the overlap of subjects, locating the conclusion of the first subject entry is crucial for identifying whether subjects overlap or not, and therefore whether stretto is in evidence. Whereas some subject endings are unequivocal, others are ambiguous, leading to more than one interpretation.

In cases of fugue subjects with ambiguous endings, which involve multiple interpretations as to their lengths, I investigate how such subjects impact stretto passages that occur within a fugue. In this vein, I document potential instances of stretto using these different lengths for the same subject; in most of such cases, there are two competing interpretations as to the length of the subject. For most of the fugues in the *WTC* in which this scenario obtains, two competing subject lengths produce the same number of stretto passages with the same number of entries; either there is no stretto with either subject length, or the overlap between entries (employing either length) is large enough to accommodate the structure of a stretto passage. There are two examples of fugues that have different numbers of stretto passages depending on the interpretation of the length of the subject: the Fugue in A major from Book I (BWV 864) and the Fugue in C♯ Major from Book II (BWV 872). Excerpts of the first six measures of each of these fugues are shown in Examples 1 and 2, with possible subject lengths indicated. Despite having differing amounts of stretto based on the analysis of subject length, both these fugues have stretto regardless.

The stretto tables for these two fugues (Tables 8 and 14) include all possible stretto passages resulting from the two different subject lengths for each fugue. Stretto passages that result from either subject length are labelled with numbers, as is done for the other fugues with unequivocal subject lengths. Stretto passages that result only from the longer subject length are labelled with letters, in order to differentiate these passages from the others that result from both subject lengths. For example, depending on the subject length, there are either four or seven stretto passages in the Fugue in C♯ Major from Book II. There are multiple defensible possible lengths

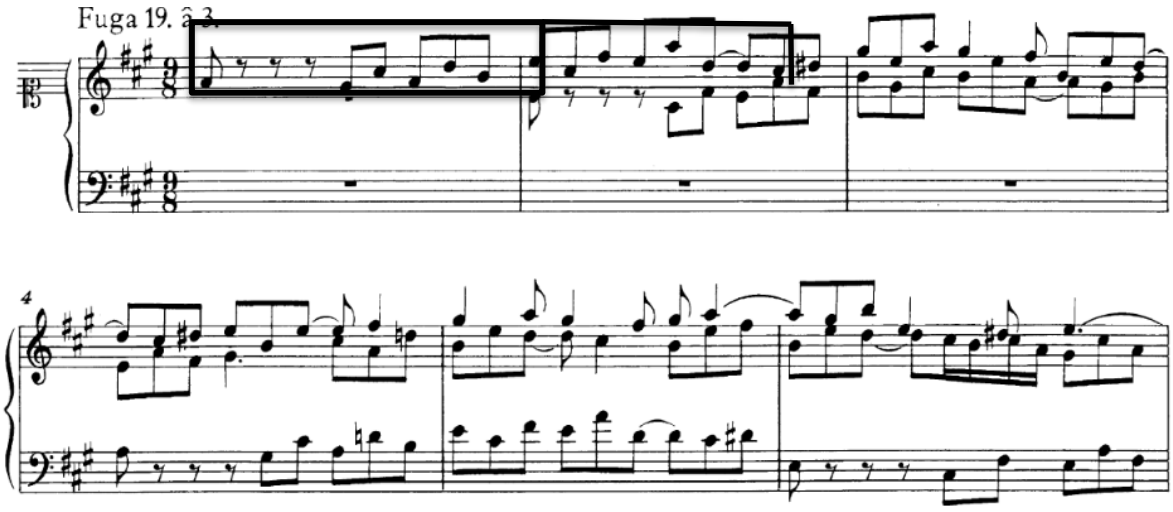
for this fugue's subject, which result in two different possible quantities of stretto. The first possible subject length is four notes long, or two beats, and although it is more of a motive than a traditional subject, it is pervasive throughout the entire composition. The second possible subject length is six notes long (four beats or a full measure) and is more tonally and rhythmically aligned with a traditional subject; however, it is presented in its entirety for the final time only 40% of the way through the fugue. Cases can also be made for eight- and twelve-note subjects, neither of which participate in additional stretto passages; thus, neither of these longer subject lengths are documented within the stretto table for this fugue. These possibilities are shown in Example 1.[54] Given that there are more stretto passages if the six-note subject version is used, stretto passages that result from either subject length are labelled with numbers (since the time-interval of the longer subject length encompasses that of the shorter length) and stretto passages that result from only the longer subject length are labelled with letters.



Example 1. Fugue in C♯ Major, WTC Book II, BWV 872, mm. 1-6. The box indicates the short subject and the line indicates possible longer subjects.

[54] The subject is analysed as 4 notes long in Frederick Iliffe, *Bach's 48 Preludes and Fugues Analysed for Students*, vol. 2 (London: Novello, 1957), 94; and, Ebenezer Prout, *Analysis of J.S. Bach's Forty-Eight Fugues*, ed. Louis B. Prout (London: Ashdown, 1910), 68. The subject is analysed as 6 notes long in Hugo Riemann, *Analysis of J.S. Bach's Wohltemperirtes Clavier*, ed. J.S. Shedlock, vol. 2 (London: Augener, 1893), 21. Discussions of multiple possible lengths, ranging from 4-12 notes long, without indication of preference, occur in Cecil Gray, *The Forty-Eight Preludes and Fugues of J.S. Bach* (London: Oxford University Press, 1948), 89; and, David Ledbetter, *Bach's Well-Tempered Clavier: The 48 Preludes and Fugues* (New Haven: Yale University Press, 2002), 249.

The other fugue with variable quantities of stretto resulting from competing subject lengths is the Fugue in A Major from Book I of the *WTC* (BWV 864). Depending on the subject length, there are either one or two stretto passages. The subject can be analyzed as ending at the beginning of the second measure, where the second entry begins in the alto, or, alternatively, the subject can be analyzed as ending on the penultimate eighth-note of m. 2 where the soprano arrives on $\hat{3}$. Both of these possibilities are shown in Example 2.[55] The longer subject accounts for about half the total subject entries in the fugue, and occurs as late as the penultimate subject entry of the fugue. Many of the entries that do not include the entirety of the longer subject have other alterations, such as beginning with a dotted-quarter tied to an eighth instead of the initial eighth followed by three eight-rests or beginning with a registrally-displaced initial eighth-note. Furthermore, these altered entries conclude at various points between the endings of the two competing subject lengths. Given that there are more stretto passages if the longer subject version is used, stretto passages that result from either subject length are labelled with numbers (since the time-interval of the longer subject length encompasses that of the shorter length) and stretto passages that result from only the longer subject length are labelled with letters.



Example 2. Fugue in A Major, WTC Book I, BWV 864, mm. 1-6. The box indicates the short subject and the line indicates the longer subject.

[55] The most common analysis is the longer subject. Citations for this longer subject length include: Hugo Riemann, *Analysis of J.S. Bach's Wohltemperirtes Clavier*, ed. J.S. Shedlock, vol. 1 (London: Augener, 1893), 124; Gray, *The Forty-Eight Preludes and Fugues*, 65; and, Frederick Iliffe, *Bach's 48 Preludes and Fugues Analysed for Students*, vol. 1 (London: Novello, 190-?), 65. I have included the shorter subject as a possibility because in addition to this version of the subject ending when the second entry begins, it is also more prevalent in the fugue; close to half of the entries in the fugue do not complete the longer subject.

BWV 846 *Book I, C Major*	Stretto Passages (Passage #)					
	1	2	3	4	5	6
location within the form (measures)	7	10.5	14	16.25	19	24
location within the form (percentage)	25.9%	38.9%	51.9%	60.2%	70.4%	88.9%
location within the form (relative)	PE	ME	ME	ME	ME	FE
number of entries	2	2	4	4	5	2
voice order	ST	BA	ATBS	SATB	TSBST	TA
pitch-interval	-11	+12	-4/-8/+15	-4/-7/-5	+5/-8/+10/-6	+11
time-interval (beats)	1	1	1/3/2	1/2/2	1/5/1/3	2
global scale degrees of subject entries	$\hat{1}/\hat{5}$	$\hat{5}/\hat{2}$	$\hat{1}/\hat{5}/\hat{5}/\hat{5}$	$\hat{1}/\hat{5}/\hat{6}/\hat{2}$	$\hat{6}/\hat{3}/\hat{3}/\hat{5}/\hat{7}$	¼
local starting scale-degree	$\hat{1}$	$\hat{1}$	$\hat{3}$	$\hat{3}$	$\hat{5}$	$\hat{1}$
subject modulates?	no	no	no	no	no	no
passage modulates?	no	yes	no	yes	yes	no
starting key	I	V	vi	vi	ii	I
ending key	I	vi	vi	ii	V	I
middle key(s)			I		V	
cadence proximity	none	none	before	none	none	before
cadence type			PAC			PAC
notes/commentary	Could be considered within a second exposition	Starts the eighth after another entry ends; the end is elided by one beat with another entry.	2nd entry omits last beat; 4th entry only includes first 3 beats; the end elides by one beat with Passage 4.		3rd entry truncated (only first entry); begins one sixteenth note after Passage 4 ends.	Many B♭s with a C pedal.
overall notes/commentary						

Table 1. BWV 846 Stretto Passages.

2.2 Stretto tables

Stretto tables form the backbone of this investigation. An example of one can be seen in Table 1, which is the stretto table for BWV 846, the Fugue in C Major from Book I of the *WTC* (this is also Table 1 in Appendix A). Every table includes a column for each stretto passage within the fugue, and rows for the different elements investigated. These rows can be separated into seven main categories: location within the form; general information about the individual entries within the stretto passage; the intervals created between entries; scale-degrees used; modulation and keys; information concerning cadences; and finally, general notes and commentary. The following sections (2.2.1-2.2.7) will describe the rows of these tables in more detail.

2.2.1 Location within the form

The first three rows of each stretto table relate to the formal placement of the stretto passages: "location within the form (measures)," "location within the form (percentage)," and "location within the form (relative)."

"Location within the form (measures)" uses a decimal system to identify where within the measure the first entry of a stretto passage begins. Decimals correspond to the formulation *(x-1)/y*, whereby *x* is the number of the beat where the passage begins and *y* is the number of beats per measure. For example, a passage beginning on beat three in triple meter (such as ⅜ or ¾) will be identified as 0.66 following the equation (3-1)/3 = 2/3 = 0.66. This formula results in the downbeat always being a whole number (with a decimal of .0). The measure number goes on the left side of the decimal, so that the downbeat of measure X is X.0, or simply X, while the third beat in common time is X.5. In other words, the given measure number is the sum of the position within the measure (calculated *(x-1)/y*) and the number of the measure it occurs within. If a passage in triple meter begins on the third beat of measure 25, it would be identified as 25.66 (such as Passage 1 in BWV 856, shown in Table 6). Passages that start on an off-beat are numbered according to the beat that they follow. For example, the Fugue in D Minor from the *WTC*, Book I (BWV 851) has a subject that begins on the second eighth note of the measure in all of the subject entries. This fugue is analyzed in Table 3 with the location markers situated at the downbeat—one eighth note before the first sounding pitch of the passage.

"Location within the form (percentage)" is the result of dividing "location within the form (measures)" by the total number of measures in the fugue. The total number of measures in a fugue in the *WTC* ranges from 27 measures to 143 measures, meaning that the measure number is a less informative marker of location than the percentage through the fugue. This measure allows for comparison across fugues to identify patterns.

The relative location of a stretto passage is based on where within fugal form the passage occurs. The following five formal markers are used in this study:

- Exposition (E) – the stretto passage occurs completely within the exposition;
- Second Exposition (SE) – the stretto passage occurs completely within the second exposition;
- Middle Entry (ME) – the stretto passage occurs after the exposition. Stretto passages are only identified as middle entries if they do not also include features of post-exposition or final-entry subdivisions.
- Post Exposition (PE) – the stretto passage includes the first subject entry that is not part of an exposition;
- Final Entry (FE) – the stretto passage includes the final subject entry of the composition.

The precise and the relative approaches to location are both useful for this investigation. The precise measurements, which use decimal points to identify the specific location within a measure that a stretto passage begins, allow for investigation into what percentage of the way through fugues passages occur. The relative measurements show relationships to the formal structure of a fugue.

2.2.2 Individual entries

The following two rows in each stretto table, "number of entries" and "voice order," pertain to the individual entries within stretto passages. The "number of entries" category provides a numeral corresponding to the total number of entries occurring within each stretto passage. This number gives an indication of the density of stretto, and allows comparison to see whether density correlates with formal location. For example, if the number is 2, there are two entries, whereby the first one overlaps with the second (two is the smallest possible number of entries

that can occur in a passage). If the number is 3, the second entry overlaps with both the first and last entries within the passage; the first and last entries may also overlap with each other, but they also may not.

Not all of the entries that occur in stretto passages are complete or in their original form (as found in their respective expositions). Some passages include subject entries that are truncated, ornamented, melodically inverted, rhythmically augmented or diminished, and/or have a slight alteration in rhythm or pitch-intervals. Occasionally, some entries occurring in stretto are based on a second subject, not the original subject from the exposition at the beginning of the fugue. These entries must overlap with each other as would any group of entries within a stretto passage.

The “voice order” category provides a string of letters corresponding to the voices that enter the composition by articulating the subject and the order in which they appear. Within this study, all three-voice fugues are analyzed using the labels S, A, and B (corresponding to Soprano, Alto, and Bass, respectively). Additionally, four-voice fugues are analyzed using these same labels, plus T (for Tenor). Finally, analyses of five-voice fugues incorporate the labels T1 and T2 (corresponding to Tenor 1 and Tenor 2, respectively), in addition to S, A, and B. T1 is higher than T2, so from highest to lowest, the voices in a five-voice fugue are S, A, T1, T2, and B. Utilizing this methodology, if a stretto passage includes three entries in the Soprano, Alto, and Bass (in that order), then the “voice order” is SAB; if they enter in the opposite order, the “voice order” is BAS.

2.2.3 Intervals between entries

“Pitch-interval” and “time-interval (beats)” are the sixth and seventh rows in each stretto table, and they identify the intervals between successive entries within a stretto passage. For example, if each successive entry enters an octave lower and a measure after the previous entry (in ¾ time), then the pitch-interval is -8 and the time-interval is 3. If the intervals between entries are not all the same, then the interval between each pair of adjacent entries is indicated individually. For example, if a stretto passage has three entries and the interval between the first and second is a ninth higher and four beats and the interval between the second and third is a fifth higher and two beats, then the pitch-interval will be marked as +9/+5, and the time-interval will be indicated

as 4/2. This example is from Passage 10 of BWV 865 and can be seen in Table 10. Time-interval is crucial for testing the claims in the literature that subject entries get closer together near the end of the fugue, what this study terms the density hypothesis. If that is true, there should be smaller numbers in the "time-interval" later in the fugue. Pitch-interval is included as a factor which may be related to how stretto is used at particular points in a fugue's form. In particular, it could be used to investigate whether pitch-intervals get less predictable towards the end of fugues that are permeated with stretto throughout, as was described by Schubert and Neidhöfer in their discussion of stretto fugues.[56] For example, there could be more perfect consonant pitch-intervals in early stretto passages and more imperfect or dissonant pitch-intervals in later stretto passages within fugues that could be defined as "stretto fugues."

2.2.4 Scale-degrees

"Global scale degrees of subject entries" indicates the starting scale degree of each entry in the context of the home key. This information relates the pitch material back to the tonic of the home key. "Local starting scale degree" indicates the starting scale degree of the first entry of the stretto passage in the context of the local key.

2.2.5 Modulation

The next five rows, rows 10-14 in each stretto table, pertain to modulation. "Subject modulates?" and "passage modulates?" both indicate yes or no answers. The following three rows elaborate on the answer to "passage modulates?", indicating what the starting, ending, and middle keys are in roman numerals. The roman numerals are relative to the home key, and "middle key(s)" is left blank if the passage does not modulate or if there are not any keys in the middle of the passage that are different from the starting or ending key. The roman numerals are included to show how the passage modulates in case any correlation could be explained or refined by patterns within this data, as well as to inform cadence identification, as which type of cadence is present is strongly linked with which key is present.

[56] Schubert and Neidhöfer, *Baroque Counterpoint*, 338.

2.2.6 Cadences

Following the categories regarding modulation are two rows related to cadences. First, "cadence proximity" indicates whether or not there is a cadence associated with the stretto passage by either indicating where the cadence is in relation to the passage, or indicating that there is no cadence. Cadence proximity is marked with one of six options:

- Before – the first entry of the stretto passage begins immediately after the conclusion of the cadence.
- Beginning – the cadence resolution is elided with the beginning of the first subject entry of the stretto passage, so that the first note of the subject happens at the same time as the goal chord of the cadence.
- End – the cadence concludes the stretto passage at the end of the last subject entry (the final harmony of the subject is also the resolution of the cadence).
- After – the cadence concludes just after the end of the last subject entry, with the entry ending during the cadence, directly before the resolution.
- Middle – the cadence occurs somewhere in the passage other than the beginning or end.
- None – there is no cadence associated with the stretto passage.

If there is a cadence, it has an identifier under "cadence type"; if there is not a cadence, that row is left blank. The goal note for all cadences must occur on a strong beat.[57] Possibilities for cadences are as follows:[58]

- Perfect Authentic Cadence (PAC) – a dominant to tonic cadence with $\hat{5}$-$\hat{1}$ in the bass and ending with $\hat{1}$ in the soprano.
- Imperfect Authentic Cadence (IAC) – a dominant to tonic cadence with $\hat{5}$-$\hat{1}$ in the bass and ending with a $\hat{3}$ or $\hat{5}$ in the soprano.
- Contrapuntal Cadence (CC) – a vii°^{6} or V4/3 to tonic cadence.[59]

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[57] In this case, a strong beat can be the downbeat in any meter, or the third beat in quadruple meter.

[58] Cadence types are based on descriptions in Chapter 13 of Schubert and Neidhöfer, *Baroque Counterpoint*, 217–21.

[59] Steven Laitz describes contrapuntal cadences as "cadences in which either the dominant or the tonic (or both) are inverted" Steven G. Laitz, *The Complete Musician: An Integrated Approach to Theory, Analysis and Listening*, 4th ed. (New York: Oxford University Press, 2016), 332.

- Half Cadence (HC) – a cadence with the dominant chord as the goal.

Cadences are often discussed in relation to form in classical music. For example, Caplin's work on classical form includes much discussion about cadences and cadence types; the general index in his 1998 book *Classical Form* includes almost fifty entries that begin with either the word "cadence" or the word "cadential." Caplin writes that "music in the classical style is often characterized as highly goal directed, and many of the principal goals in a composition are the cadences marking the ends of themes and theme-like units. Identifying the cadences is thus a critical objective of any formal analysis."[60] They are included in this investigation because of the focus on formal function.

When theorists discuss cadences, they usually include the key area in the cadence label.[61] Despite these two pieces of information being highly related, the type of cadence and the local key are included as separate pieces of information in this study. In the tables, the key information is included a few lines above the information about cadence because it relates to both modulation and cadence identification.

2.2.7 Notes and commentary

The final rows of each stretto table are dedicated to notes/commentary regarding notable features of the stretto passage or of the fugue as a whole. These account for aspects that inform the information higher up in the table. For example, one such feature appears in the Fugue in C♯ Minor from Book I (BWV 849), where the stretto passages use a second subject (one that does not appear within the exposition). This section also adds information connecting stretto usage to formal function; for example, the fifth stretto passage in the D-Major fugue from Book II (BWV 874) sets up a cadence to D but then resolves to D7 instead, extending the end of the fugue. Finally, this section provides curious facts pertaining to the use of stretto in the fugue. For example, the D-Major fugue from Book II has stretto entries starting on every beat within the measure. Features that pertain to a specific passage appear in the penultimate row and the

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[60] William E. Caplin, *Classical Form: A Theory of Formal Functions for the Instrumental Music of Haydn, Mozart, and Beethoven* (New York: Oxford University Press, 1998), 42.

[61] For example, in James A. Hepokoski and Warren Darcy, *Elements of Sonata Theory: Norms, Types, and Deformations in the Late Eighteenth-Century Sonata* (New York; Oxford: Oxford University Press, 2006), the key is usually including with the name of the cadence, e.g., V:PAC, etc.

appropriate column, and features pertaining to all the passages or to the fugue as a whole appear in the final row, which is expanded underneath all of the columns.

2.3 Statistical analyses

Once the fugues of the *WTC* have been analyzed and the tables (contained in the Appendices of this document) have been filled with the information described above, statistical analyses are conducted to reveal connections within these data and to investigate the hypotheses described in section 1.4. The first step in conducting statistical analyses involves looking at the data through a broad lens by identifying what percentage of fugues in the *WTC* contain stretto (within the entire collection and in both books, separately). Additionally, it involves tallying the number of instances of the following items: 1) stretto passages per fugue, 2) stretto entries per fugue, and 3) stretto entries per passage. The second step entails investigating correlations between pairs of data and undertaking specific tests to examine the three primary hypotheses of this study. The next two subsections further expound upon the statistical methodology used in this study. Section 2.3.1 describes statistical terms that are employed within this study and are in general use within experimental literature but may not be familiar to music-theory scholars. Knowledge of definitions of these terms is necessary to understand and contextualize the tests and results described later in the thesis. After an introduction to these statistical terms, Section 2.3.2 follows up by including these terms within explanations of the specific statistical tests used for this investigation.

2.3.1 Terminology

There are a few key statistical terms and concepts which are crucial to fully understanding this study, as they will be used in the discussion of the statistical tests in 2.3.2 as well as in the discussion of the results in Chapter 3. This terminology includes: significance, *p* values, the null hypothesis, and degrees of freedom.

In everyday parlance, significance is often associated with importance or noteworthiness. In science, it has a very particular meaning—that the result was unlikely due to chance. This can be referred to as “statistical significance”, and is defined as “a property of the results of an empirical

investigation suggesting that they are not due to chance alone."[62] The probability value (or *p* value) that is conventionally used in psychology to identify significance, and will be used in the statistical tests of this study for that purpose, is $p < .05$. Probability values that are higher than .05 will be counted as not significant, and probability values that are lower than .05 will be counted as significant. There is nothing particular about this number that makes it ideal for this purpose, and in medical fields (where the stakes are much higher) a more stringent, lower *p* value for higher confidence that the results are valid; however, a significance value of .05 has been used in statistics since 1925 and is used conventionally across many disciplines that use statistical methods.[63] If the *p* value is higher than the level of significance, then there is said to not be evidence of effect (this does not count as evidence that there is no effect).

Related to statistical significance and *p* values is the null hypothesis. This term is defined in inferential statistics as "the provisional hypothesis that there is no difference or no relationship and that the observed experimental results can therefore be attributed to chance alone. If the statistical test rejects the null hypothesis, then the alternative hypothesis may be accepted and the effect that has been observed may be considered statistically significant."[64] In other words, if the *p* value is lower than the level of significance, meaning that it meets the criteria for statistical significance, then the null hypothesis may be rejected. In this study, the general null hypothesis is that there is no connection between parameters of stretto and location within the form. Specific null hypotheses for specific statistical tests will be discussed as necessary.

The final term to be discussed here is *degrees of freedom*. For each statistical test undertaken, there will be a value expressing the degrees of freedom for that particular test with that particular quantity of data. This value is defined in statistics as "a quantity associated with many significance tests and with estimates of variability such as the sample variance, defined as the number of observations minus the number of restrictions on the freedom of the observations to

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[62] Andrew M. Colman, "Statistical Significance," in *A Dictionary of Psychology* (Oxford University Press, 2015), https://www.oxfordreference.com/view/10.1093/acref/9780199657681.001.0001/acref-9780199657681.
[63] Kerry S. Sauley and Arthur G. Bedeian, ".05: A Case of the Tail Wagging the Distribution," *Journal of Management* 15, no. 2 (June 1, 1989): 335-44.
[64] Andrew M. Colman, "Null Hypothesis," in *A Dictionary of Psychology* (Oxford University Press, 2015), https://www.oxfordreference.com/view/10.1093/acref/9780199657681.001.0001/acref-9780199657681.

vary."[65] The degrees of freedom will be shown on the left side of an equation in parentheses; for example, $r(144) = .17$, $p = .04$. The *r* pertains to the specific test used, in this instance a Pearson Correlation Coefficient test with a result of .17, a *p* value of .04, and a value of 144 for the degrees of freedom. This result has a *p* value of $< .05$, so this result is significant and the null hypothesis would be rejected.

2.3.2 Statistical Tests

This section describes the specific measures used to test each of the three hypotheses described in Chapter 1, the *conclusion*, *density*, and *quantity* hypotheses, as well as a few additional tests performed. The data used for these statistical tests are the data described in Sections 2.1 and 2.2. In the case of fugues with more than one possible set of data due to different possible amounts of stretto caused by variable interpretation of subject length (BWV 864 and BWV 872), the data pertaining to the highest reasonable number of stretto passages are the data that are used in statistics, figures, and counts.

For the *conclusion* hypothesis, which states that stretto becomes more frequent towards the end of a fugue, with the number of stretto passages increasing as the end of a fugue approaches, I investigate the percentage-complete through the fugue where each stretto passage occurs. I use a histogram to show where each of the stretto passages in a fugue begins, represented by numbers corresponding to the percentage-complete of an entire fugue at which point the passages occur. A histogram is a type of graph "in which the values of scores of a quantitative variable are plotted, usually on the horizontal axis, and their frequencies are represented by the heights of the bars on the vertical axis."[66] The values on the horizontal, or x-, axis are continuous and divided into segments called bins, and each bar shows the number of items that occur within that segment.

In order to verify the statistical significance of these results, I used a two-tailed single-sample *t*-test. The single-sample *t*-test is sometimes called "Student's *t*-test" after the pseudonym that

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[65] Andrew M. Colman, "Degrees of Freedom," in *A Dictionary of Psychology* (Oxford University Press, 2015).
[66] Andrew M. Colman, "Histogram," in *A Dictionary of Psychology* (Oxford University Press, 2015).

William Gosset published under when he described the measure.[67] This test is used to compare the distribution of a sample against a hypothetical mean. I used the hypothetical mean of the null hypothesis (50% through the fugue) in order to ask whether stretto passages begin more frequently in the second half of the fugue than the first half. The null hypothesis here is that stretto begins fairly equally across the locations within a fugue. The results of a *t*-test are given in the form $t(87) = 3.01$, $p = .003$, as described in section 2.3.1.3 for the Pearson correlation test.[68] Here, the *t* pertains to the Student's *t*-test, with a result of 3.01, a significance value of .003, and a degrees of freedom value of 87.

For the *density* hypothesis, which states that time-intervals between onsets of adjacent entries within stretto passages become smaller towards the end of a fugue, a Pearson Correlation Coefficient (*r*) was used along with a plot graph to test for a connection between time-intervals and location through the fugue. This measure is also called "linear correlation coefficient" or "product-moment correlation coefficient," and is defined as

> A statistic representing the degree of linear relationship between two variables. It is defined as the covariance of the two variables divided by the product of their standard deviations, hence it may be thought of as a measure of standardized . . . covariance. It is symbolized by *r*, and it ranges from 1.00 for perfect positive correlation, through zero for uncorrelated variables, to −1.00 for perfect negative correlation.[69]

This hypothesis predicts that time-intervals correlated with the location of the passage through the fugue will result in a significant negative correlation, with time-intervals decreasing as percentage through the fugue increases. This test, along with all other Pearson Correlation

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[67] John H. McDonald, "One Sample T-Test," *Handbook of biological statistics*, http://www.biostathandbook.com/onesamplettest.html

[68] A two-tailed test is an inferential statistical test which determines "the probability of obtaining a result as extreme as the one observed, in either direction from the expected value, if the null hypothesis is true." (Andrew M. Colman, "2-Tailed Probability," in *A Dictionary of Psychology* (Oxford University Press, 2015)). I performed the two-tailed single-sample *t*-test on my data with the calculator from the *Social Science Statistics* website (Jeremy Stangroom, "Single Sample T-Test Calculator", *Social Science Statistics*, https://www.socscistatistics.com/tests/tsinglesample/default.aspx).

[69] Andrew M. Colman, "Product-Moment Correlation Coefficient," in *A Dictionary of Psychology* (Oxford University Press, 2015).

Coefficient tests performed, was performed using the calculator from the *Social Science Statistics* website.[70]

For the *quantity* hypothesis, which states that the number of entries per passage will become higher toward the end of a fugue, another Pearson Correlation Coefficient is used. Here the number of entries in a passage is compared with the percentage through the fugue that that passage begins, with the hypothesis predicting a positive correlation as the number of entries per passage is expected to increase as the percentage through the fugue increases.

Further Pearson Correlation Coefficient tests are performed for variables which might be expected to be related. For example, the location of the first stretto passage of the fugue (the initial stretto articulation) is compared with the total number of stretto passages or stretto entries within that fugue. Means and standard deviations are also used to zoom out even further and investigate the *WTC* as a whole. The arithmetic mean or average (calculated by adding all the values together and dividing that by the total number of values) is used in conjunction with the standard deviation, which is "a measure of the degree of dispersion, variability, or scatter in a set of scores, expressed in the same units as the scores themselves, defined as the square root of the variance."[71] Standard deviation is represented by the shorthand SD (such as SD = 2.92). Within this study, the mean and standard deviation are used to investigate how many stretto passages are in any one of the stretto-containing fugues in the *WTC*.

This statistical methodology and all the tests that are described here are used in an effort to illustrate in a broad way how stretto is used by Bach in this collection of fugues. They open a new perspective and combine with more traditional methods of music analysis to create an expanded way to understand stretto, not only as a contrapuntal technique, but also a compositional technique in the *WTC*. These tests can provide information regarding typical usage, which can in turn inform our understanding of individual works.

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[70] Jeremy Stangroom, "Pearson Correlation Coefficient Calculator," *Social Science Statistics*, https://www.socscistatistics.com/tests/pearson/default.aspx

[71] Andrew M. Colman, "Standard Deviation," in *A Dictionary of Psychology* (Oxford University Press, 2015).

The terms and procedures catalogued in this chapter elucidate the process of this study. They are the means of this research. The product of this research, the results that came from applying these methods to the forty-eight fugues of J. S. Bach's *Well-Tempered Clavier*, are presented in the next chapter.

Chapter 3

3 Results

The method that is chronicled in Chapter 2 is put into practice in this chapter with the forty-eight fugues of the *Well-Tempered Clavier*. This method looks at the frequency and the typical or average patterns of usage of stretto, and this chapter discusses these patterns within this corpus. It turns out that twenty-one of the forty-eight fugues in the *WTC* include passages with stretto (44%). These fugues are fairly evenly divided between the two books, with slightly more than half of the twenty-one stretto-containing fugues being located in Book I (12 of the 21). Indeed, half of the fugues in Book I have stretto, while 38% of the fugues in Book II have stretto. These counts constitute the most basic of this chapters' results, revealing the quantity of fugues that the upcoming data will be drawn from.

This chapter is divided into four sections. Section 3.1 investigates the frequency of stretto within this corpus at the level of the stretto passage and the stretto entry. This section includes discussion regarding how many stretto passages are in a fugue, how many stretto entries are in a stretto passage, and how many stretto entries are in a fugue. Section 3.2 builds on this information by discussing where these stretto passages occur in the fugue, and describes the results for the tests investigating the *conclusion*, *density*, and *quantity* hypotheses. Section 3.3 adds pitch information to the mix, investigating the pitch-intervals, scale-degrees, and cadences used in stretto passages in the *WTC*, and Section 3.4 investigates how stretto is used in relation to fugal form. Each of these sections will include analytic examples from *WTC* fugues.

3.1 Number of Stretto Passages and Entries in Fugues

Prior to tackling the primary hypotheses of this investigation, which will be discussed in Section 3.2, this section will address the frequency of stretto within the twenty-one fugues in this corpus that contain stretto. Section 3.1 first addresses how many stretto passages occur in each fugue, then how many stretto entries occur in each fugue, and then concludes with a discussion about how many stretto entries occur in each stretto passage.

The mean number of stretto passages within these twenty-one fugues that use stretto is 4.19 (*SD* = 2.92). The distribution of stretto passages per fugue is shown in Figure 1. There are two

distinctive fugues which have ten or eleven stretto passages, and the rest of the fugues in the *WTC* have seven or fewer distinct stretto passages. The most common number of stretto passages in a given fugue is two, with five different fugues containing precisely two stretto passages, and the median number of stretto passages in a fugue is 3, meaning that half of the *WTC* fugues with stretto have three or fewer stretto passages.

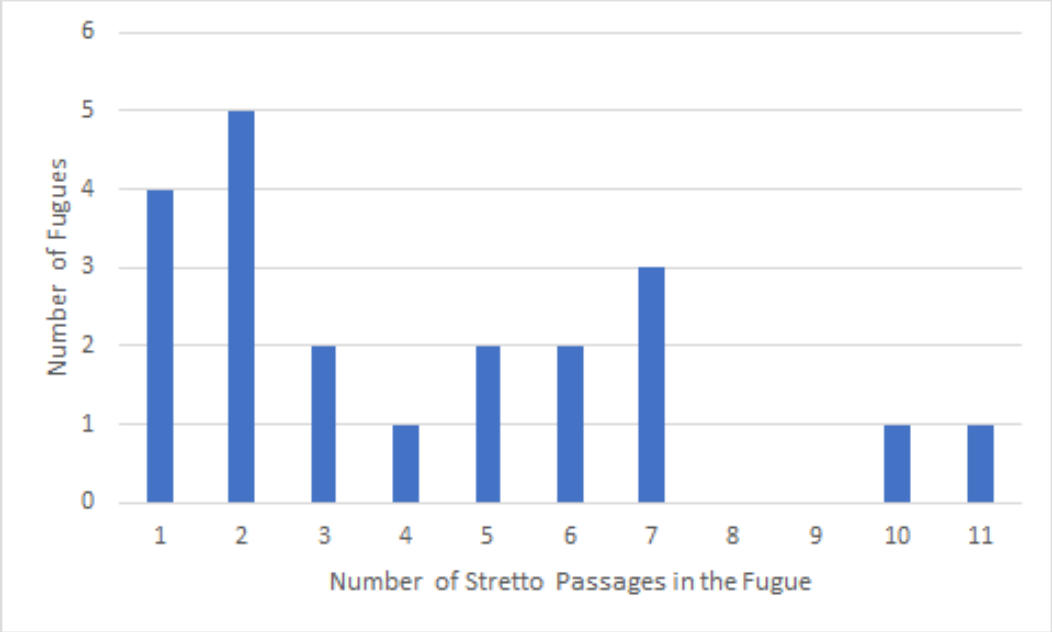

Figure 1. The number of stretto passages per fugue.

The fugues which contain exactly two distinct stretto passages are: BWV 855 (Book I, E Minor), BWV 860 (Book I, G Major), BWV 861 (Book I, G Minor), BWV 864 (Book I, A Major), and BWV 875 (Book II, D Minor). The Fugue in A Major from Book I (BWV 864) is one of the two fugues for which I discuss multiple possible subject lengths. In this instance, there could be one or two stretto passages, one of which occurs in the exposition and one that occurs as a middle entry. The eight stretto passages that belong to the four other fugues with precisely two stretto passages all occur as middle entries. I will discuss a couple of these fugues with two stretto passages and the fugues with unusually large numbers of stretto passages before moving on to the number of stretto entries per fugue.

There are many similarities between the two stretto passages which occur in the Fugue in G Major from Book I (BWV 860). Neither of these passages contain a complete subject entry, nor do they simply end prematurely. The original subject is four measures plus a downbeat long, and

each of the four entries involved in stretto (i.e., the two entries occurring in both passages) excludes the second of these measures. Three of these entries also exclude the fourth measure; only the first entry in Passage 1 includes it. These passages also both include the soprano as one of their voices, have pitch-intervals of a double octave, and have time-intervals of one measure.[72] A primary difference between these two passages is the direction of the pitch-interval; in Passage 1 the first entry is two octaves higher than the second entry, while in Passage 2 the first entry is two octaves *lower* than the second entry. The subject in this fugue is Paradigm 11 from Renwick's classification system, which emphasizes $\hat{8}$-$\hat{7}$ in the subject. Functionally, this means that this is a Category 3 subject, which is a non-modulating subject ending on dominant harmony. Despite being shrunken, the subject entries within this fugue's stretto passages still maintain this characteristic. Whichever key the stretto passage begins in, it ends on the dominant of that key.

The Fugue in D Minor (BWV 875) is the only one of the five fugues with precisely two stretto passages which belongs to the second book of the *WTC*. Both of the stretto passages in this fugue occur in the third quarter of the composition. I have analyzed the subject as being a full two measures long and ending on the downbeat of m. 3, which aligns with Renwick's analysis of the subject belonging to Paradigm 1 and transforming into Paradigm 2a in the bass entry, where the last note is altered from $\hat{3}$ to $\hat{1}$.[73] This analysis, however, doesn't account for this full subject not being utilized in the fugue at all past the exposition. Most of the entries that are involved in stretto passages are three beats shorter than the original subject, and the one entry that is longer is still one beat shorter than the original subject.

The two outliers that have more than seven stretto passages are the Fugue in A Minor from Book I of the *WTC* (BWV 865), which has eleven of such passages, and the Fugue in D♯ Minor from Book I of the *WTC* (BWV 853), which has one less, for a total of ten stretto passages. Both of these fugues use altered versions of their subjects in stretto, and both use the subject paradigm

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[72] Passage 1, however, delays the onset of the first note by an eighth-note (and shortens it accordingly) so that the absolute time-interval of the first note of each entry is an eighth-note less than a measure, while every other note in the first entry has a time-interval of a full measure with the corresponding note in the second entry.

[73] Renwick, *Analyzing Fugue*, 44. Paradigm 1 features $\hat{5}$-$\hat{4}$-$\hat{3}$ in the subject and $\hat{8}$-$\hat{8}$-$\hat{7}$ in the answer, whereas Paradigm 2a extends Paradigm 1 by articulating $\hat{5}$-$\hat{4}$-$\hat{3}$-$\hat{2}$-$\hat{1}$ in the subject and $\hat{8}$-$\hat{8}$-$\hat{7}$-$\hat{6}$-$\hat{5}$ in the answer.

Renwick categorizes as 2a (5̂-4̂-3̂-2̂-1̂/8̂-8̂-7̂-6̂-5̂). Coincidentally, these two fugues also have the same number of measures (eighty-seven).

In the Fugue in A Minor, there are a lot of similarities between the eleven stretto passages. The time-interval between adjacent entries is consistently two beats, or half a measure, except for in Passages 8 and 10. These two passages are also the only ones in this fugue that contain more than two entries, and both include at least one time-interval of two beats and exactly one time-interval that is larger than two beats. Regarding entries that are altered in stretto, Passages 5, 6, 7, and 9 of this fugue use entries that are in melodic inversion exclusively. Two of the entries in Passage 8 and one of the entries in Passage 10 are also inverted melodically. Towards the end of the fugue, many of the entries are also truncated. Passage 7 is the first stretto passage with shortened entries; its first entry omits the final two beats (four notes) and its second entry omits the final beat (two notes). Passage 8 includes the last complete entry of the composition, with three complete entries and one that omits the final two beats. The entries in the remaining passages all end either two, four, or six beats early (the entire subject is twelve beats long, so up to half of the subject is eliminated).

The subject alterations in the Fugue in D♯ Minor are even more dramatic. Most of the subject entries within these stretto passages are altered at least a little bit. In Passage 1, both entries delay the tenth note (the beginning of the tail) by introducing an eighth-rest and shortening it by an eighth-note to compensate. In Passage 2, both entries begin with an ascending fourth, replicating the answer-form from the exposition, but instead of continuing with an ascending third (as does the answer), they continue with an ascending second (as does the subject after it ascends a fifth). This pattern continues for each entry that begins with a fourth within a stretto passage.[74] The first entry in Passage 3 has an extra ornamental note added right before the end, as well as an extended first note. In the latter sense, the first quarter note is doubled and serves as both the final note in the previous entry from the previous passage and the first note in this stretto passage: the initial quarter note is tied to the quarter note that ends the previous entry.

[74] There are also subjects within the fugue that begin with an ascending fourth *and* continue with an ascending third in the form of the original answer, but none of these are within stretto passages.

The stretto passages in the second half of the fugue include more dramatic alterations. Passages 4, 5, 7 and 8 all use entries in melodic inversion. The Fugue in D♯ Minor and the Fugue in A Minor discussed above are two of eight fugues in the *WTC* to include melodically-inverted entries in stretto. Like the A-Minor fugue, the D♯ Minor fugue also has truncated entries in its stretto passages. The entries in Passages 6 and 7 are all truncated, with entries concluding after a measure and a half and excluding the subject's tail. This fugue also includes durationally-augmented entries in stretto: the final three stretto passages, Passages 8-10, all have one entry in augmentation. The middle entry in each passage is augmented, with each note doubled in length. The augmented subject is in a different voice in each passage. It is in the bass in Passage 8, the alto in Passage 9, and the soprano in Passage 10. The slower moving voice is particularly prominent in Passage 10, where in addition to being in the highest voice, it is an octave or more above the next-highest voice (the alto) 89% of the time.

Although the Fugue in A Minor and the Fugue in D♯ Minor from Book I of the *WTC* have more stretto passages than any of the other fugues in the *WTC*, neither of them actually has the highest number of subject entries involved in stretto. The minimum number of entries that a stretto passage can have is two, and the majority of stretto passages in these two fugues have exactly two entries. Each of these two fugues has exactly twenty-five subject entries in stretto. There is one fugue, however, that has more. Despite having only seven stretto passages, the Fugue in C♯ Major from Book II of the *WTC* (BWV 872) has twenty-*six* subject entries.[75]

[75] This is one of the fugues that has multiple subject-length analyses leading to two possible quantities of stretto. As discussed in Chapter 2, this fugue either has four or seven distinct stretto passages, and I am using the analysis with seven passages for this analysis. There are twenty-six subject entries occurring in the seven stretto passages of the longer subject-lengths; there are only fourteen subject entries in the four stretto passages that are relevant to all subject-length analyses.

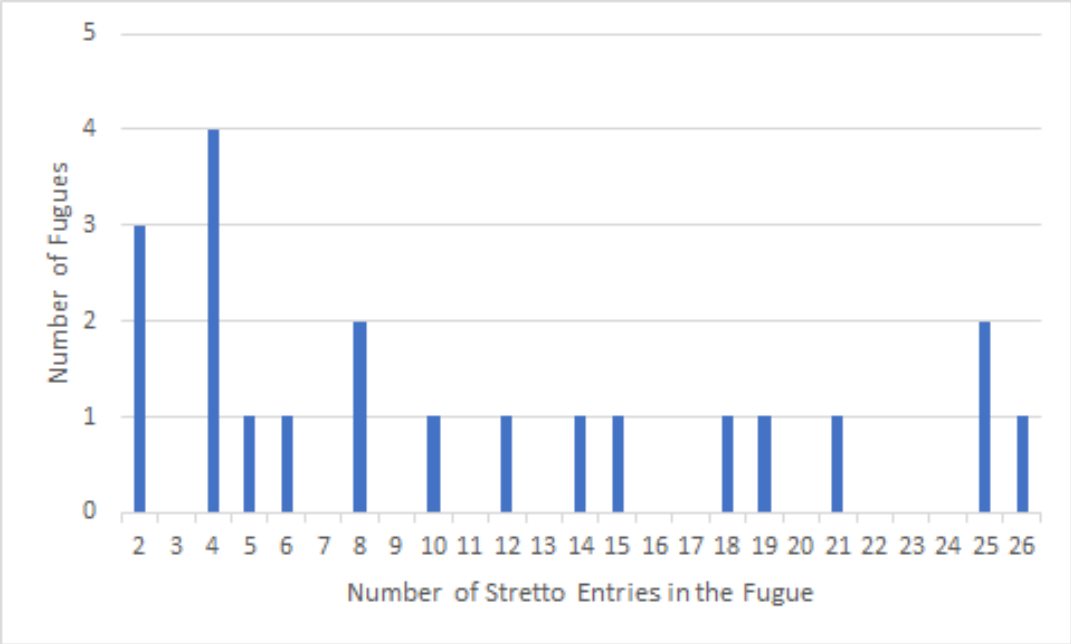

Figure 2. The number of stretto entries per fugue.

At the level of number of entries involved in stretto per fugue, the mean is 11.10 (*SD* = 8.05). The full range of entries per fugue is illustrated in Figure 2. The most common number of stretto entries per fugue is four, despite the mean being considerably higher than that, and the median number of entries in stretto is eight. Four fugues have precisely four subject entries in stretto, three fugues have precisely two subject entries in stretto, and the rest of the fugues have either a unique number of subject entries in stretto or an equivalent number of such entries that they share with one other fugue. Two fugues have precisely eight stretto entries.

One of the fugues with the median number of stretto entries per fugue is the Fugue in F Major from Book I of the *WTC* (BWV 856). This fugue has three stretto passages. The first passage begins with the final entry of a second exposition, and has two subject entries, and the second and third passages each have three subject entries. All three stretto passages have a time-interval of exactly two measures and a pitch-interval of an octave between adjacent entries. The first and last passages use ascending octaves, whereas the second uses a descending octave.

The number of stretto entries per fugue is related to both the number of entries per passage and the number of stretto passages. Thus, fugues with exceptionally high numbers of entries in stretto have either high numbers of stretto passages, such as BWV 853 and BWV 865 discussed above, high numbers of entries per stretto passage, or a combination of both.

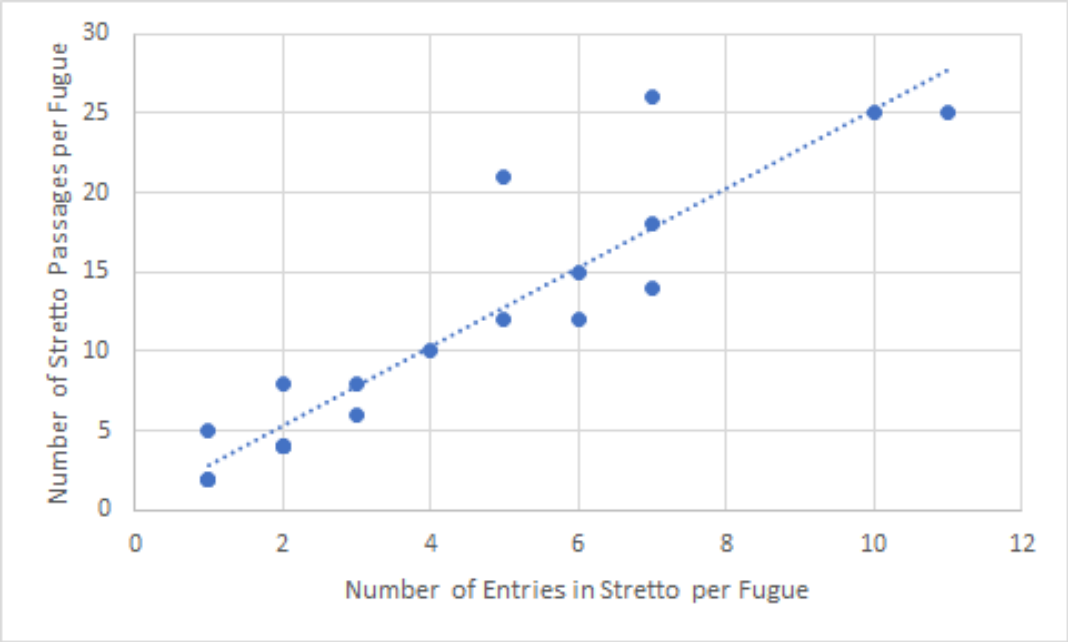

Figure 3. Correlation between the number of stretto passages and the number of stretto entries per fugue ($r(19) = 0.93$, $p < .00001$).

As would be expected, there is a significant correlation between the number of stretto passages per fugue and the number of entries in stretto per fugue. This is shown in Figure 3. If there were equal numbers of entries in each stretto passage, then the correlation would be r = 1 and the line of best fit would intersect every point on the graph at a 45° angle.[76] For example, if each stretto passage had exactly two entries, then the line might extend from (2, 1) to (22, 11), where the x-value (2 or 22) is the number of entries in stretto in the fugue and the y-value (1 or 11) is the number of stretto passages in the fugue. Ten of the twenty-one fugues with stretto in the *WTC* belong to this group, with precisely two entries in each stretto passage. There are three fugues that are actually plotted at (2, 1), like our hypothetical, but none at (22, 11). The fugue in this group with the highest number of stretto passages is the Fugue in B♭ Minor from Book II of the *WTC* (BWV 891) which is plotted at (14, 7). There is also one fugue at the points (12, 6) and (6, 3), and there are four fugues at point (4, 2). The eleven other fugues that have more than two

[76] Results of the Pearson Correlation Coefficient test are given in terms of the variable *r*, where *r* = 1 is a perfect correlation using the Pearson Correlation Coefficient (which stipulates that when one variable increases, the other variable also increases with complete predictability).

entries per stretto passage result in a less steep line of best fit and an actual correlation of r(19) = 0.93, $p = < .00001$.[77] This is, unsurprisingly, a very strong correlation.

As is shown in Figure 4, more than half of all of the stretto passages in the *WTC* have precisely two entries. There are forty-five stretto passages with two subject entries apiece, and seventy-five passages with four entries or less. There are four stretto passages with more than four subject entries. The stretto passage with the highest number of stretto entries has four more entries than the next highest, and this passage occurs in the Fugue in C♯ Minor from Book I of the *WTC* (BWV 849). This fugue has five stretto passages and twenty-one entries within those passages. Although there are passages with only two or three entries, the third passage has a grand total of ten entries. This fugue is also unusual in that all five of the stretto passages are using a second subject, not the original subject from the exposition. Although the first subject is never used in stretto, it does occur in the third and fifth stretto passages, in counterpoint with the second subject's stretto. The second subject does have a sort-of exposition in mm. 49-61, although there are a couple of reasons that it is not a full exposition. Firstly, it begins away from the home key with the first entry of the second subject being in the subdominant. Secondly, although the first and second entries employ the same generic scale degrees, they do not share all the same specific ones. That is, the first includes raised sixth and seventh degrees in F♯ minor, while the second entry includes lowered versions of them. Furthermore, the entries begin on three different scale degrees ($\hat{1}$, $\hat{3}$, and $\hat{5}$) instead of the regular two (i.e., subject and answer).

The final quarter of the fugue contains almost all of the stretto passages. There are two entries involved in a stretto passage beginning in m. 64, and there are nineteen entries involved in stretto between mm. 84-110. These nineteen entries are divided into the remaining four separate stretto passages by other material; however, the third, fourth, and fifth stretto passages are almost one massive stretto passage. The gap between each of them is less than a measure, and one more entry could eliminate the gap. The stretto passage with ten entries, Passage 3, includes an ascending-fifths sequence, starting with the second entry and continuing with the following five entries. When the stretto passage breaks out of the sequence, a descending octave-shift

[77] The equation r(19) = 0.93, $p < .00001$ means that the result of a Pearson Correlation Coefficient test was 0.93, with the probability that this correlation was a result of chance being extremely low. The 19 refers to the degrees of freedom, which for the Pearson Correlation Coefficient is two less than the number of items being compared. There are twenty-one fugues, so the degrees of freedom in this case is nineteen.

precipitates a second consecutive entry beginning on $\hat{5}$. These two entries are not identical, however, as they use different forms of the subject. The first begins with an ascending fourth whereas the second begins with an ascending fifth. These final entries build towards a cadence in C♯ minor. The fifth stretto passage begins with entries in parallel thirds in the Alto and Tenor 1 voices. This is slightly ambiguous territory, as they are not independent entries and yet they also are not a single entry. Therefore, I have treated it in an x+y form in the tables,[78] with the information pertaining to each voice being included, while counting it as a single entry in counts and statistical tests.

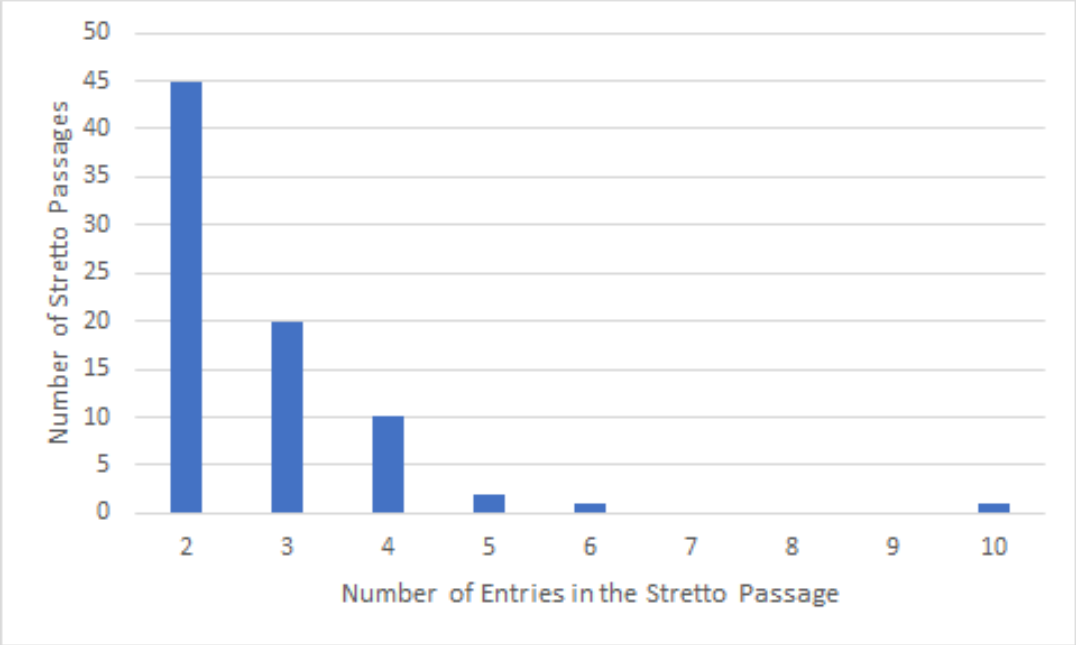

Figure 4. The number of entries in stretto per stretto passage.

3.2 Time-Based Measures

In this section, the dimension of time is added to the discussion. The stretto entries and passages that were discussed in Section 3.1 in terms of their density (quantity per fugue and per stretto passage) will now be discussed in terms of their location as a percentage through the fugue. The three specific hypotheses given in Section 1.4 all relate to this time-domain, and the results

[78] For example, the voice order is (A+T1)T2, meaning that the alto and first tenor voices enter together, followed by the second tenor voice. This way of labelling the voice order impacts that of the pitch-interval, which is labelled (-11)+(-13) because the interval between the lower voice in the first entry (the first tenor) and the second entry is a descending eleventh, while the interval between the higher voice in the first entry (the alto) and the second entry is a descending thirteenth.

pertaining to those hypotheses will be given here. Each hypothesis will be discussed in turn. First, the conclusion hypothesis, which expects there to be more stretto passages in the final sections of a fugue. Second, the density hypothesis, which expects time-intervals between successive entries to get smaller towards the end of a fugue. Finally, the third hypothesis, the quantity hypothesis, which expects that the number of stretto entries per passage will increase towards the end of a fugue.

All of the stretto passages in this corpus start between the very beginning to 95% of the way through the fugue, with a mean of 57% (*SD* = 23%). Despite our conclusion hypothesis predicting that stretto passages occur more towards the end, this mean is closer to the half-way point than the end. Fugue passages show up more frequently in the second half of fugues, but shortly after the midpoint rather than farther towards the end. A histogram showing these data is shown in Figure 5. This graph visibly demonstrates that, as expected, there are more stretto passages in the second half of fugues. Each bar in the graph represents a range of percentages of a fugue in which a stretto passage may begin. For instance, the first bar (2%, 14%) corresponds to stretto passages that begin in the first 2% to 14% of the way through a fugue. In this particular range, there are four such passages.[79] Each bin contains all of the stretto passages that begin within a section of about 12% of the fugue. The bin with the most passages is the one containing the passages that begin between 51-63% of the way through the fugue, with 18 passages beginning in that range. I performed a two-tailed single-sample t-test on the location of each stretto passage corresponding to the percentage through the fugue that each passage occurs. The test confirms that there are significantly more stretto passages beginning after the half-way mark than before the half-way mark of the fugue.[80] This distribution, however, corresponds to a

[79] The first bin begins at 2% because that is the earliest stretto begins. Because we start numbering measures at 1 and not at 0, the first beat of a composition will be calculated as some number higher than 0%, depending on how long the composition is. In this study, two compositions have stretto beginning at the beginning of measure one; one calculates as 2% and the other as 3%. Incidentally, these are also the two fugues with different subject lengths resulting in different quantities of stretto. With the shorter subject length, neither of these first-measure passages are actually stretto, and one of the other passages in this bin would not be counted as stretto either. The only fugue that has a stretto passage beginning in this region regardless of analyzed subject length is the Fugue in D Major from Book II, BWV 874.

[80] The result of this test is $t(87) = 3.01$, $p = .003$. As described in Chapter 2, the actual result of the test is 3.01, with the *t* showing that it was a *t*-test, the 87 in parentheses showing the degrees of freedom, and the *p* = .003 showing the probability that this result occurred by chance.

proportional increase of stretto passages, not as the *end* approaches, but rather, a point a bit *earlier* than the end.

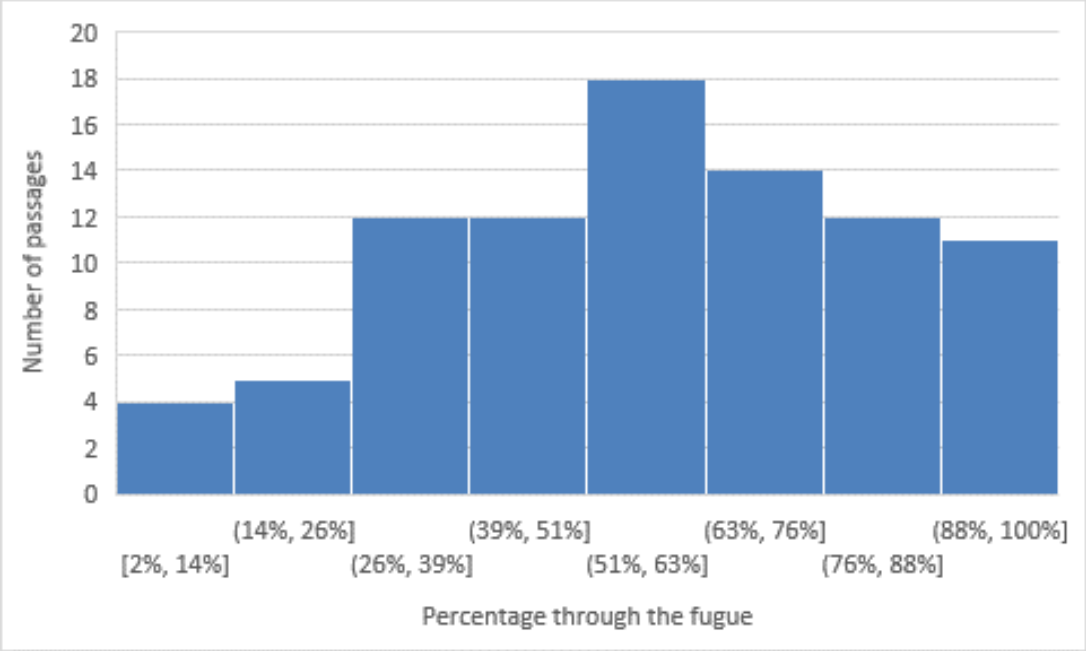

Figure 5. Histogram of the position (percentage) of all stretto passages in the corpus ($t(87) = 3.01$, $p = .003$).

Despite more stretto happening overall in the second half of fugues in this collection, not all fugues in the *WTC* have the majority of stretto in the second half. One example of this is the Fugue in C♯ Major from Book II (BWV 872), which has only one passage and three entries in its second half, despite having seven passages and twenty-six entries total. Passage 4 occurs about 71% of the way through the fugue with one entry in each of the three voices, including one melodically-inverted entry and one durationally-augmented entry.[81] Almost all the stretto in this fugue occurs in the first half of the composition, with the first three passages occurring within the first quarter of the fugue. Passages A, B, and C all exclusively use a time-interval which is precisely the length of the shorter subject interpretation (two beats, or one beat when the subject

[81] The seventh passage is labelled as Passage 4 because the first three are labeled as Passages A, B, and C due to an alternate interpretation of the subject length. In this respect, the Fugue in C♯ Major from Book II is one of two fugues for which I discuss multiple possible subject lengths. The current analysis incorporates stretto passages utilizing the longer of the two proposed subject lengths. See Chapter 2 for more information.

appears in diminution).[82] Passage A starts at the very beginning of the fugue and includes all three entries of the exposition. There is a measure or less of other material between Passages A, B, and C. The fourth passage, Passage 1, begins only one beat after the conclusion of Passage C, and Passage 2 begins half a measure after Passage 1 ends. The result is a fugue with rich stretto activity in the first half which tapers off later in the fugue. Even if a shorter subject is chosen for analysis, two of the three unequivocal stretto passages are in the first half of the fugue and the onset of subject entries are closer together in the first half of the fugue, not the second half.

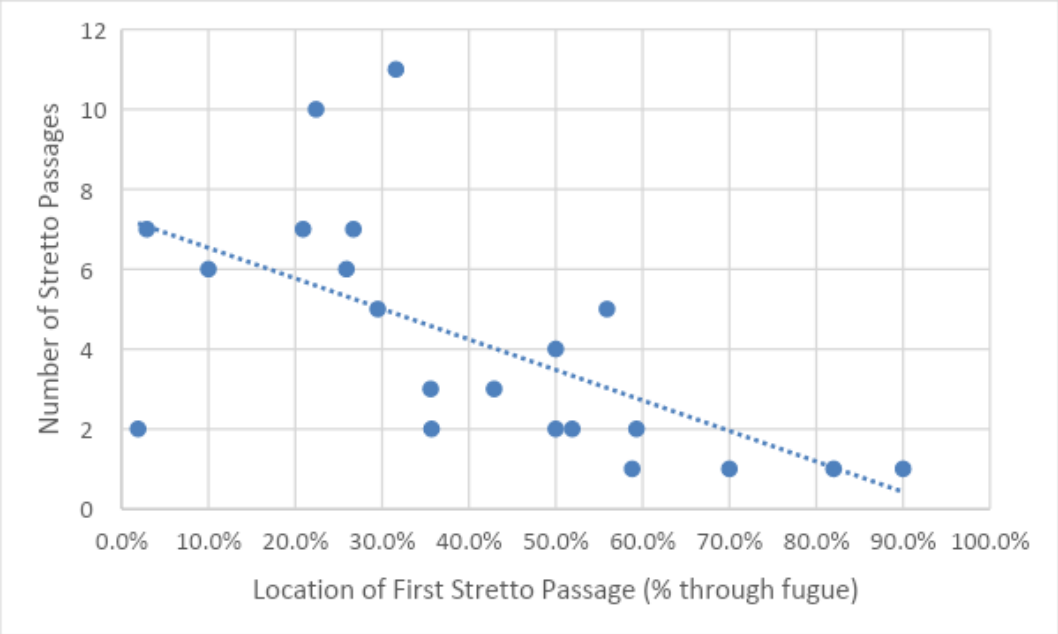

Figure 6. Location of the first stretto passage (as a percentage) correlated with the total number of stretto passages in the fugue ($r(19) = -.61$, $p < .05$).

Within the *WTC*, the first stretto passage of a given fugue ranges from the very beginning of the exposition to 90% of the way through the fugue, with a mean of 41% (*SD* = 23%). When the initial stretto articulation occurs early in the fugue, there is opportunity for high levels of stretto to take place for the practical reason that if 10% of the fugue has elapsed when the first stretto passage ends, there is still 90% of the fugue left with the possibility of stretto occurring anywhere within that. If the first stretto passage ends 90% of the way through the fugue there is only 10% of the fugue left with that possibility. Coupled with the expectation that stretto near the beginning of a fugue may be setting up a "stretto fugue," which will use stretto pervasively, there

[82] Stretto passages are labelled with numbers if they count as stretto for all given subject lengths and with letters if they only count as stretto for the longer subject length(s).

is an expectation that fugues with early initial stretto articulation will also have high numbers of stretto passages and entries in those passages. Indeed, the location of the first stretto passage (identified by the percentage throughout a fugue that it occurs) correlates with the total number of stretto passages in the fugue (see Figure 6) and the total number of subject entries involved in stretto in the fugue (see Figure 7).[83] These correlations are statistically significant and show that fugues with earlier instantiations of stretto tend to include more stretto overall, although not all fugues with early stretto include stretto throughout. For example, BWV 872, which was discussed in Section 3.2 as having almost all of its stretto in the first part of the composition. The Fugue in D Major from Book II (BWV 874), on the other hand, is an example of a fugue that has stretto near the beginning and pervading throughout the composition. Of the six stretto passages in this fugue, one occurs in the exposition and one includes the final subject-entry of the fugue. The passages begin 10%, 28%, 42%, 56%, 67%, and 89% of the way through the fugue, respectively. Each of these stretto passages include either two or three subject entries, and altogether they include subject entries that start on each quarter-note beat in the measure. The last three stretto passages use only a time-interval of one quarter-note beat, which is half of a half-note pulse, which is designated by the time signature as the main pulse. In addition to the stretto passages being relatively evenly spaced throughout this fugue, it shows a progression of the time-intervals getting shorter through the composition. The first stretto passage has a time-interval of a measure (four quarter-notes or two half-notes), passages two and three have time-intervals that are either four or two quarter-note beats (two or one half-notes), and passages four to six only have time-intervals of one quarter-note.

[83] The correlation between the location of the first stretto passage and the total number of *stretto passages* in the fugue is $r(19) = -.61$, $p < 0.5$ and the correlation between the location of the first stretto passage and the total number of *subject entries in stretto* in the fugue is $r(19) = -.58$, $p < .05$.

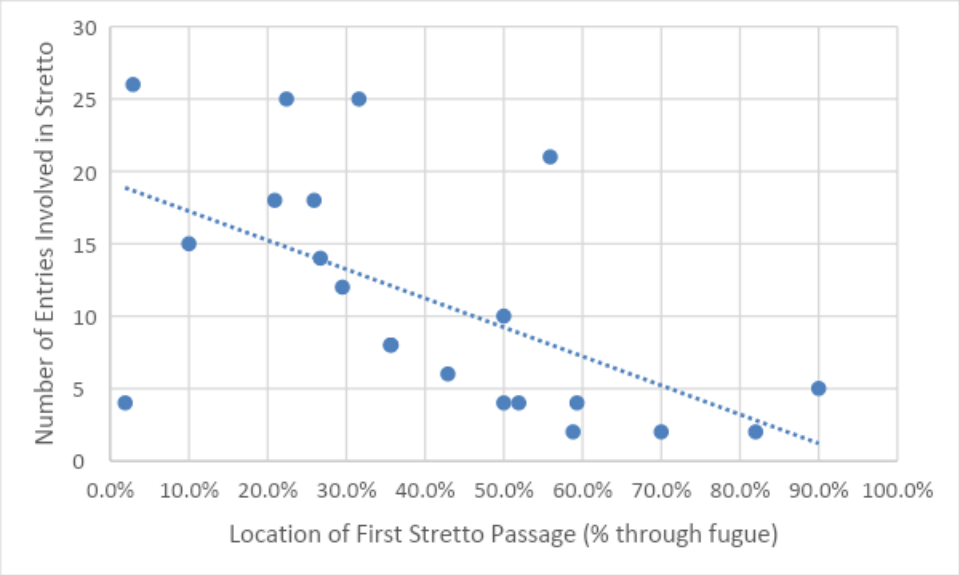

Figure 7. Location of the first stretto passage (as a percentage) correlated with the total number of subject entries involved in stretto in the fugue ($r(19) = -.58$, $p < .05$).

The density hypothesis from Section 1.4 predicts that time-intervals between the onsets of adjacent entries within stretto passages will decrease towards the end of the fugue, as they do in the D-Major fugue discussed in the previous paragraph. In other words, we expect a negative correlation where low percentages through the fugue predict bigger time-intervals, and high percentages predict smaller time-intervals. The actual correlation between the time-intervals between entries in each passage and the percentage through the fugue where each passage occurs is shown in Figure 8. The correlations demonstrate a small but statistically significant *increase* in the size of time-intervals as the end of a fugue approaches, seemingly refuting the hypothesis that time-intervals typically decrease in such contexts.[84] Instead of a negative correlation, which

[84] The Pearson Correlation Coefficient test result for these data is $r(144) = .17$, $p = .04$.

would agree with the density hypothesis, we see a positive correlation.

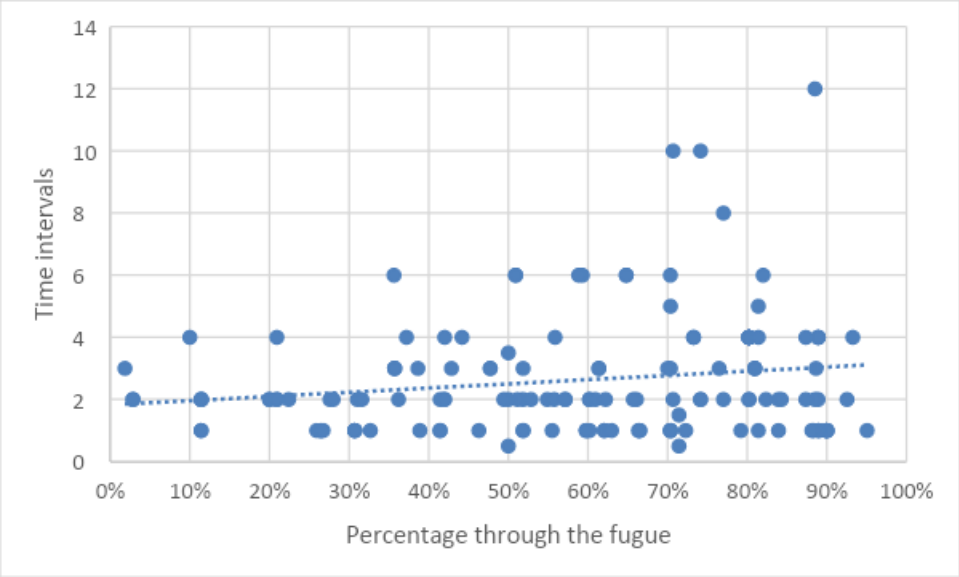

Figure 8. Time-intervals correlated with the location (as a percentage) of the passage through the fugue, with line-of-best-fit ($r(144) = .17$, $p = .04$).

The quantity hypothesis could explain why the correlation between time-interval size and location through the fugue is the opposite of what the density hypothesis predicts. If gaps between subject entries or stretto passages are being eliminated as subject entries become closer together towards the end of the fugue, then there might be a combination of longer and shorter time-intervals which are averaging to slightly longer time-intervals. This is illustrated in Figure 9, where two hypothetical situations are shown. Both situations include three subject entries. In the first situation, there is a stretto passage with two entries and there is a third entry directly following the stretto passage. In the second situation, the onsets of each of these three entries become closer together. Now, the time-interval between the first two entries is indeed smaller; however, now there are three entries instead of two in this passage, as the third entry is now close enough to count as stretto. The time-interval between the second and third interval is quite large, much larger than the time-interval between the first two entries in the first scenario. The two time-intervals within the second scenario combine to be larger, on average, than the time-interval in the first scenario, despite the entries in the second scenario actually being closer together. If later stretto passages have more entries in stretto, then the results shown in Figure 8 could be explained without contradicting the reasoning behind the density hypothesis.

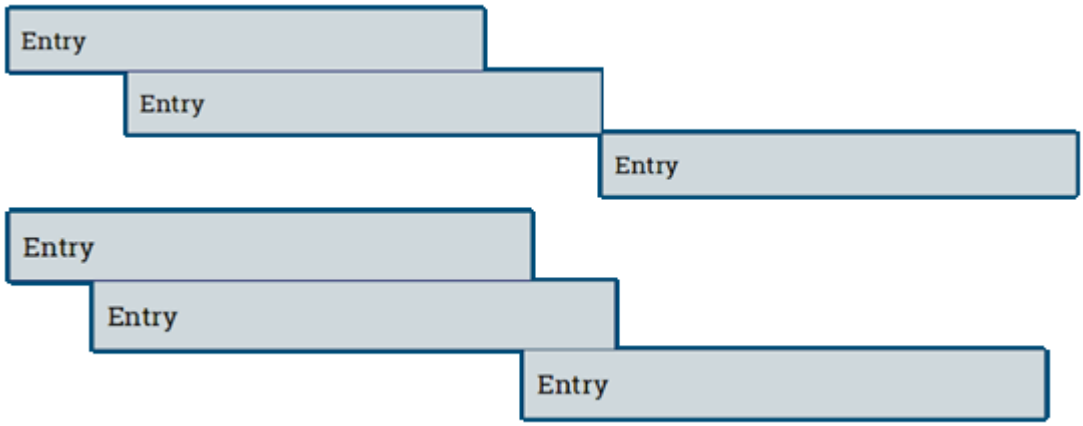

Figure 9. Illustration of how subject entries becoming closer together can increase the average time-interval by increasing the number of entries included in the stretto passage.

One example which supports this explanation is the Fugue in C Major from the *WTC* Book I (BWV 846). The six entries in this fugue are located throughout the majority of the fugue, starting from directly after the exposition and ending two bars before the double bar line. Passage 1 could possibly be considered to be the beginning of a second exposition. This could be considered a second exposition because each voice has a second entry on either the tonic or the dominant before other entries occur in different keys. This exposition would include the two entries of Passage 1, the following entry, and the first entry of Passage 2. I have not analyzed this as a second exposition, however, because the final entry, which initiates Passage 2, is in close stretto with a time-interval of one beat with a subject entry starting on $\hat{2}$. Additionally, only the first of the four entries begins on the tonic, and by the beginning of Passage 2 the fugue has modulated to the dominant.

A closer look at this set of subject entries shows a subject entry nestled between two stretto passages but not connected to either of them. Passage 1 and Passage 2 both have a time-interval of one beat. After Passage 1 there is only one beat before the next subject entry, and that subject entry ends directly before the onset of the first entry of Passage 2. Hypothetically, if the gaps between the onset of each of these five subject entries were two or three beats closer together, the average time-interval would go up significantly because breaks between stretto passages and other entries are eliminated and replaced with smaller, additional, overlaps (which show up as larger time-intervals). Indeed, this is illustrated in the following stretto passages in this fugue. The very next passage, Passage 3, has a time-interval of one beat between the first two entries

but a third entry is added before the end of the passage, at a time-interval of three beats from the second entry, which is adding to the length of the stretto passage but also making the time-interval on average larger. Each of the following stretto passages, with the exception of the last one which only has two entries, has a time-interval of one beat between the first two entries and then longer intervals between subsequent entries.

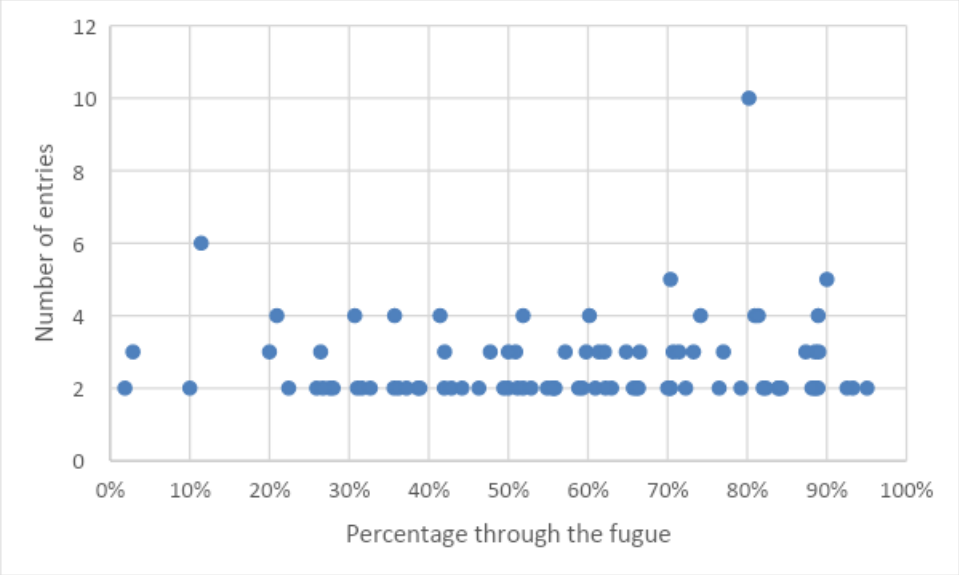

Figure 10. Number of entries per passage is not correlated with the location (%) through the fugue ($r(86) = .06$, $p = .59$).

In order to test the hypothesis that the number of entries per passage increases as the end of a fugue approaches, which would defend the previous explanation, I examined the correlation between the number of entries in each passage and the percentage through the fugue of where each passage occurs. It turns out that there is no significant correlation.[85] As is shown in Figure 10, the number of entries per passage does not depend upon the passage's location within the fugue. This result does not provide evidence to support the *quantity* hypothesis.

3.3 Pitch-Based Measures

The time gap between two adjacent subject entries, or the time-interval, is one way that we can investigate the relationship between onsets of neighboring subject entries occurring in stretto. Another way is the pitch-interval, or the change in pitch between the onset of one subject entry

[85] The result of a Pearson Correlation Coefficient test was ($r(86) = .06$, $p = .59$).

and the subsequent entry. In this section, I will look first at pitch-intervals, and then at other elements of the pitch-domain that are relevant to stretto, namely scale-degrees. After investigating the pitch-interval content of stretto in the *WTC*, I will look at which scale degrees are used in the onsets of subject entries and stretto passages. Finally, I will look at the scale-degree content of the fugue subjects, comparing the *WTC* fugues with stretto to the *WTC* fugues without stretto.

In the stretto passages of the *WTC*, there are approximately the same number of descending and ascending pitch-intervals, with 45% ascending and 55% descending. These intervals range from a unison to a nineteenth, but can be better appreciated when reduced to simple intervals. The bar graph in Figure 11 illustrates interval occurrences when all intervals have been reduced to within one octave, maintaining direction. The graph ranges from -8 to +8, with negative numbers referring to descending intervals and positive numbers referring to ascending intervals. Unsurprisingly, the perfect intervals occur far more than the imperfect intervals. The most commonly occurring pitch-interval in stretto within this corpus is the descending fifth, which occurs twenty-nine times, followed by the ascending octave occurring twenty-five times.

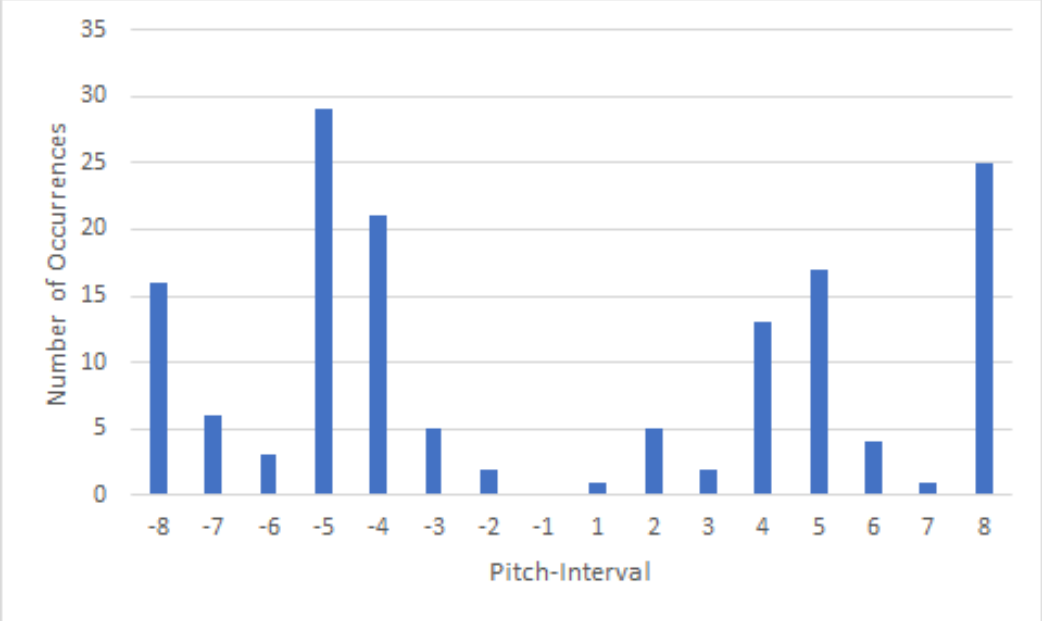

Figure 11. Pitch-interval occurrences.

Graphing pitch-intervals against time is not particularly revealing. A slight pattern can be seen when intervals are reduced to within one octave and the element of direction is eliminated. This

is achieved by taking the absolute value of each interval. For instance, a label of a fourth would represent both a descending and ascending fourth, including its compounds, such as an eleventh. Although the perfect intervals visually appear to be fairly well-distributed, the imperfect intervals seem to occur slightly more often towards the end. This pattern is a bit clearer when the unisons, fourths, fifths, and octaves are removed from the graph, as is shown in Figure 13.

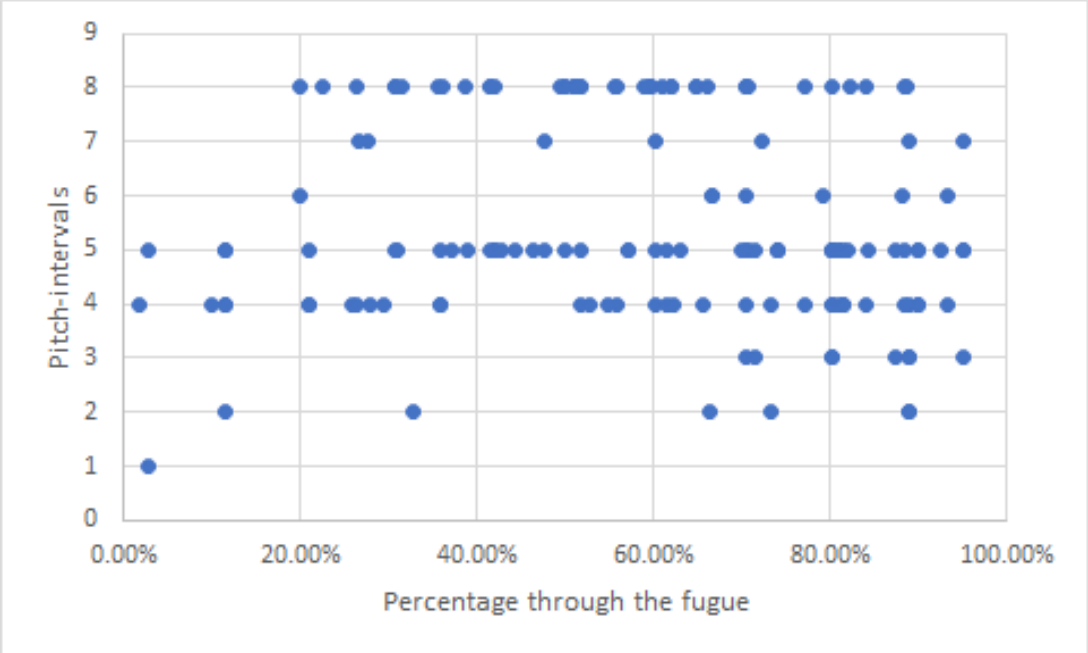

Figure 12. Non-directional pitch-intervals within an octave plotted against time.

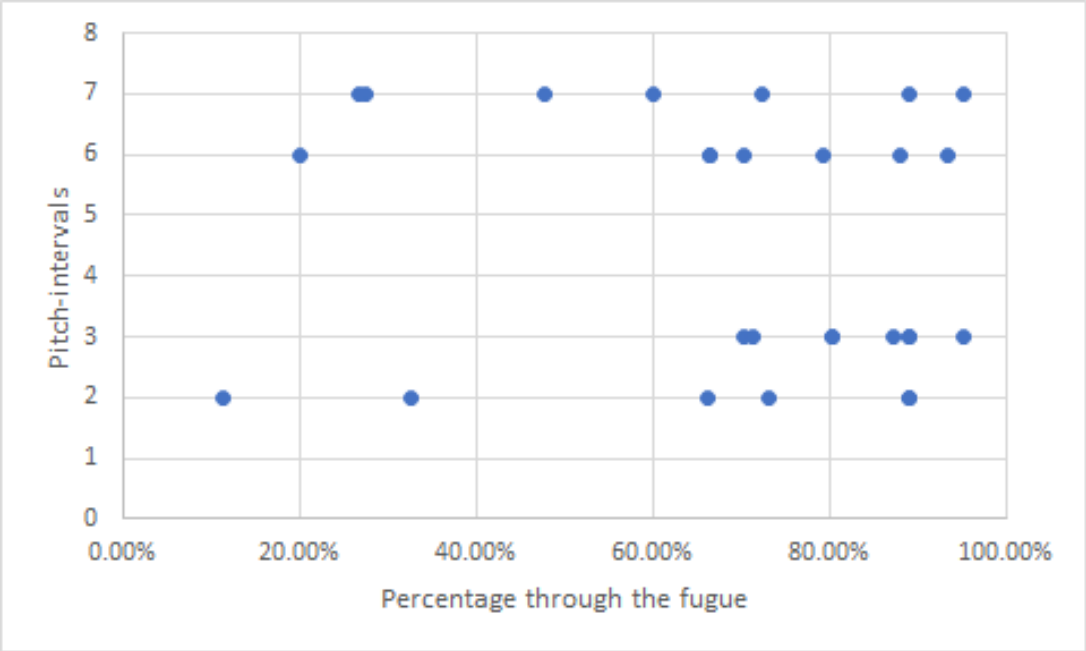

Figure 13. Non-directional pitch-intervals within an octave plotted against time, only 2nds, 3rds, 6ths, and 7ths plotted (4ths, 5ths, and 8ths omitted).

Another way of looking at pitch-content is by investigating scale degrees, both as they relate to the overall key of the piece (global scale degrees) and how they relate to the surrounding material (local scale degrees). In the *WTC*, the global scale-degrees that begin each stretto entry help illustrate how the pitch-content of stretto passages relate to the home key. As shown in Figure 14, $\hat{1}$ and $\hat{5}$ occur quite prominently, with more than half of all subject entries that occur in stretto beginning on either $\hat{1}$ or $\hat{5}$ within the home key.

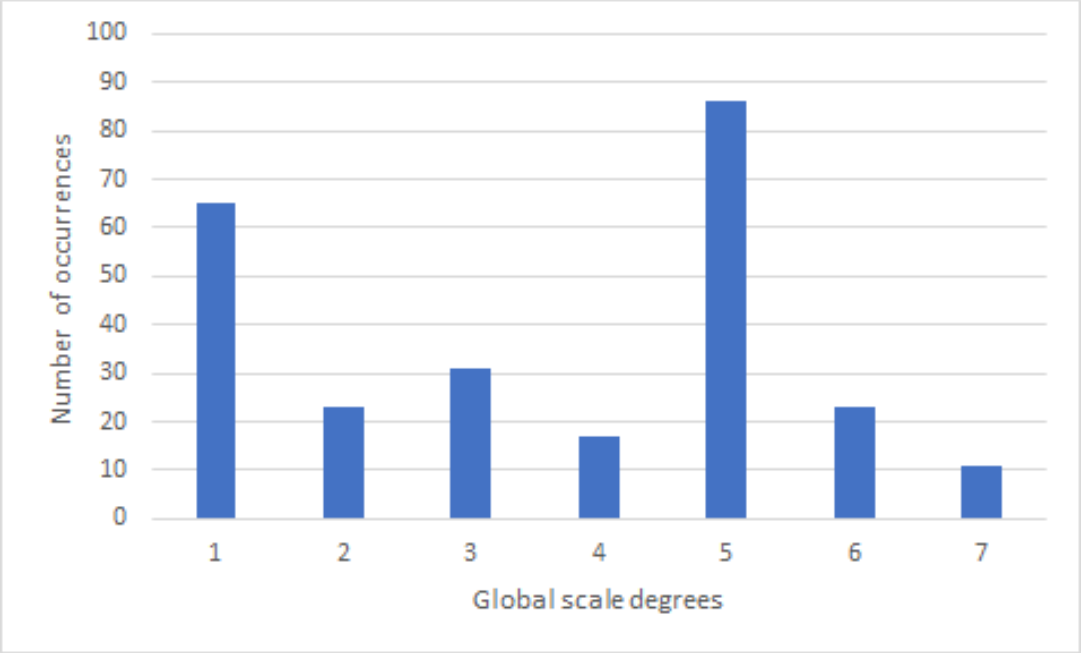

Figure 14. Global scale degrees, the first note in each subject entry in each stretto passage.

Whereas global scale degrees relate back to the key of the composition, local scale degrees relate to the local key. Unsurprisingly, $\hat{1}$ and $\hat{5}$ are also strongly represented by local starting scale degrees. The global scale degrees shown in Figure 14 represent all stretto entries that occur within stretto passages; the local scale degrees shown in Figure 15, however, refer only to the pitches that begin the first subject entry within each stretto passage. The justification for tabulating local scale degrees in this manner stems from analyzing passages that modulate in mid-stream. During the process of modulation (moving from one local key to another), ambiguity of scale-degree identity can evince itself. In this context, a scale degree can conceivably belong to either the starting key or concluding key of a passage depending on the way one analyzes it. But deciding upon only one interpretation of scale-degree identity (out of the possible two that often prevail) in such a context imparts an analytical bias, thus skewing the data. Therefore, with the aim of precision in mind, the local scale degrees shown in Figure 15 refer only to the pitches that begin the first subject entry within each stretto passage, since such pitches unequivocally reside in a single, local key. Referring back to Figure 15, it shows stretto passages that begin on $\hat{2}$, $\hat{3}$, $\hat{4}$, $\hat{6}$, and $\hat{7}$; however, the lion's share begin on $\hat{1}$ and $\hat{5}$. Indeed, $\hat{1}$ and $\hat{5}$ make up more than seventy-five percent of the local starting scale degrees, with $\hat{1}$ slightly edging out $\hat{5}$.

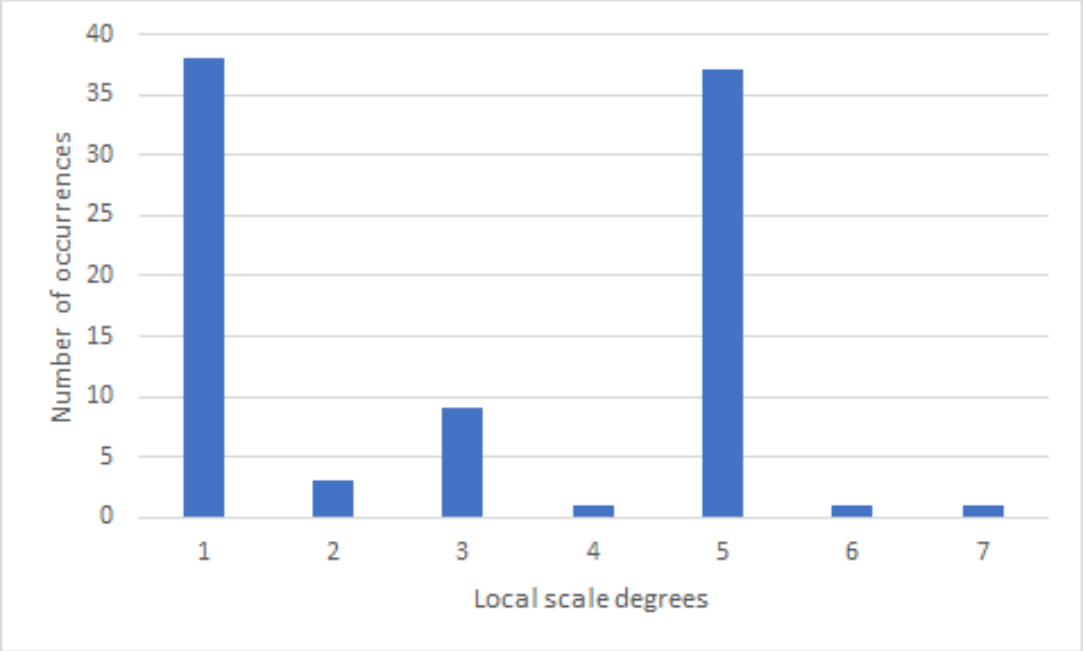

Figure 15. Local starting scale degrees, the first note in each stretto passage.

Beyond the pitch-content of global scale degrees that initiate stretto entries, and local scale degrees that initiate stretto passages, we have scale-degrees that form the tonal structure of the subjects and their answers. Of the thirty paradigms that Renwick defines in analyzing fugue, eight are used in stretto passages of the *WTC*, and thirteen are used across stretto- and non-stretto-containing fugues in the *WTC*. These thirteen paradigms are outlined in Figure 16: paradigms 1-5a belong to category 1, paradigms 6-10 belong to category 2, and paradigms 11-17 belong to category 3. Figure 17 is a bar graph showing how many fugues utilize each subject in the *WTC*, broken down into fugue subjects that use stretto and those that do not.

These paradigms describe the tonal structure of the subject and answer as they occur in the exposition. There are two fugues that use a second subject for stretto rather than the subject from the exposition: the C♯ minor and E minor fugues from Book I (BWV 849 and BWV 855). In these cases, the paradigm from the first subject in the exposition is included in Figure 17 as a fugue without stretto, since that subject does not participate in stretto. The second subjects in both these fugues do not participate in strong expositions and do not articulate clear-cut subject paradigms; therefore, these second subjects are not included within Figure 17. Thus, despite there being twenty-one stretto-containing fugues in the *WTC*, only nineteen of them use first subjects (with their respective subject paradigms) in stretto.

Paradigm	Subject Scale Degrees	Answer Scale Degrees
1	5̂-4̂-3̂	8̂-8̂-7̂
2	1̂-3̂-2̂-1̂	5̂-7̂-6̂-5̂
2a	5̂-4̂-3̂-2̂-1̂	8̂-8̂-7̂-6̂-5̂
3a	5̂-6̂-7̂-8̂	1̂-3̂-♯4̂-5̂
4	1̂-5̂-1̂	5̂-2̂-5̂
5	1̂-2̂-3̂	5̂-6̂-7̂
6	8̂-8̂-7̂	5̂-4̂-3̂
7a	5̂-6̂-5̂	2̂-2̂-1̂
9	1̂-2̂-5̂	5̂-5̂-1̂
8a + 2[86]	1̂-2̂-♯3̂-♯4̂-5̂/3̂-2̂-1̂	5̂-5̂-♯6̂-♯7̂-8̂/3̂-2̂-1̂
11	8̂-7̂	5̂-(♯)4̂
12a	5̂-6̂-5̂	2̂-3̂-2̂
13	1̂-2̂-3̂-4̂-5̂	5̂-6̂-7̂-1̂-2̂

Figure 16. Renwick's paradigms which Bach uses in The Well-Tempered Clavier.

The distribution of which subject entries are used in fugues with stretto in the *WTC* and which subject entries are used in fugues without stretto in this same corpus, shown in Figure 17, gives an idea about which subject paradigms might be more conducive to subjects that work well in stretto. The most common subject paradigm, regardless of whether or not there is stretto, is paradigm 1 (5̂-4̂-3̂/8̂-8̂-7̂). Twenty-two of the forty-eight fugues in the *WTC* have a subject using this paradigm, and twelve of those also use stretto. It seems that this paradigm can be conducive to stretto, but it is used in fugues without stretto almost as frequently. Nine *WTC* fugues use unique subject paradigms that are not used elsewhere in the corpus; of these nine, the six not

[86] Renwick describes the Fugue in B Minor from the *WTC* Book I (BWV 869) as a two part subject, which is possible because it is a modulating subject. The subject begins with one paradigm, and upon concluding that paradigm's scale degrees it modulates to the dominant and iterates another paradigm there. (*Analyzing Fugue*, 63).

used in stretto may not be particularly conducive to stretto, while the three that are used in stretto may be particularly conducive to stretto. This figure only shows information about one characteristic which may make a subject more or less likely to be used in stretto, however, making it difficult to make conclusions.

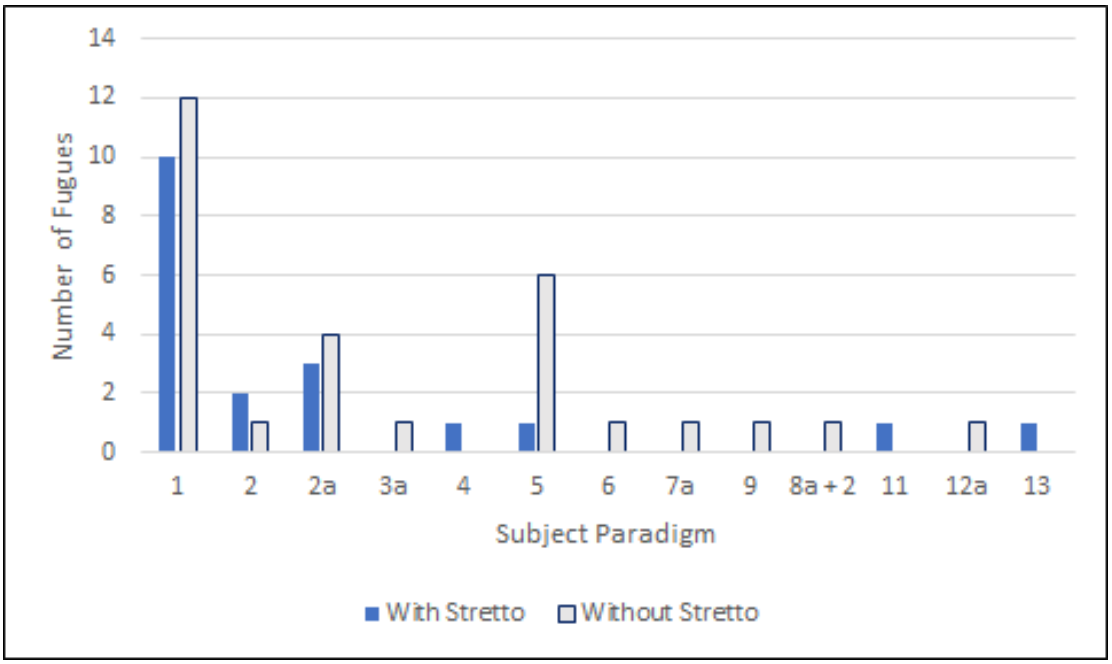

Figure 17. Well-Tempered Clavier *fugues according to subject paradigm and whether or not they have stretto. The blue bars on the left show the number of fugues that use that paradigm and have stretto; the light grey bars on the right show the number of fugues that use that paradigm and do not have stretto. The paradigms are labelled using the numbering system William Renwick describes in* Analyzing Fugue.

3.4 Location within the Form

Using the traditional analyses of fugue form, with expositions, episodes, and middle entries, the formal sections of the fugue are vastly different sizes. Even separating post-exposition and final-entry stretto passages out from middle entries, there are considerably more stretto passages occurring as middle entries than elsewhere. While it is true that only three of the *WTC* fugues have stretto in the exposition, it is also the case that a single fugue can have many middle-entry stretto passages, but no fugue has more than one stretto passage in the exposition, and by definition a single fugue can have a maximum of one stretto passage labelled post-exposition and one stretto passage labelled final-entry.

As was described in Chapter 1, a typical expectation for stretto is that it will occur primarily towards the end of the fugue and that it will function to build momentum and energy towards a climactic ending. The expectation regarding location was addressed as the conclusion hypothesis in section 3.2, where I shared my findings that while most stretto occurs in the second half of a fugue, it is more likely to occur in the third quarter of the composition than the final quarter. In this section, I will investigate the functional aspect by looking at examples from the *WTC.* First, I will look at stretto examples that both conform and do not conform with the expectation of function and location working towards a climactic ending together. Finally, I will explore the three fugues that have stretto taking place in the exposition.

The Fugue in C♯ Minor from Book I (BWV 849) is a five voice fugue which was mentioned previously because it uses its second subject in stretto, rather than the original subject from the exposition. This fugue also seems to be meeting the typical expectations for stretto, with very dense stretto in the final quarter of the fugue; however, it has been argued that it doesn't have the expected function. Joseph Kerman describes this expectation in terms of a weighty climax: "The densest of strettos was supposed to be saved till the end of the composition, where it would provide a weighty climax."[87] With specific reference to this piece, Kerman then states that

> the stretto here provides no model for the *stretto maestrale*. This is not a climax of weight (such as does occur in a closer model for that device, at the end of the one other *Well-Tempered Clavier* fugue in five parts: the book I Fugue in B♭ Minor). One could speak of a climax of agitation in the Fugue in C-sharp Minor, but the climax of weight comes later.[88]

The Fugue in B♭ Minor from Book I (BWV 867), which Kerman describes as a model for the weighty climatic function of stretto, has only one stretto passage. This one and only stretto passage occurs 90% of the way through the fugue and includes all of the five voices. Each voice begins one half-note after the previous voice (one beat in cut-time) and the voices enter in order from highest to lowest. Each entry begins, alternately, with the original subject or answer (on the tonic or dominant), so the pitch-interval between the entries alternate between descending perfect

[87] Kerman, *Art of Fugue*, 26.
[88] Ibid., 26-27.

fourths and perfect fifths. Since the subject begins with a descending fourth and the answer begins with a descending fifth, and the entering voices are close together, the second note of each of the first four entries is the same note as the first note of the last four entries (they are in unison). This serves to mask the onset of each successive subject entry.

Three *WTC* fugues have stretto in the exposition: the Fugue in A Major from Book I (BWV 864), the Fugue in C♯ Major from Book II (BWV 872), and the Fugue in D Major from Book II (BWV 874). Of these three fugues, the first two—the Fugue in A Major from Book I and the Fugue in C♯ Major from Book II—were discussed in Chapter 2 to showcase the multiple subject-length analyses they elicit and the different numbers of resulting stretto passages to which such analyses correspond. Both these fugues also have their stretto mostly clustered towards the beginning of the fugue—participating in neither the location nor the function portion of our expectations. All these three fugues that feature stretto within the exposition are taken up in turn below.

First, all the stretto passages in the Fugue in A Major from Book I (BWV 864), regardless of subject length, are completed before the halfway point. Passage A, which is only a stretto passage if the longer subject length is used, utilizes the first two entries of the exposition. Passage 1, which is a stretto passage regardless of subject length, begins about 46% of the way into the fugue.

Second, the Fugue in C♯ Major from Book II (BWV 872) has either four or seven stretto passages (depending on subject length). Similar to the A-Major fugue, almost all of the stretto occurs in the first 40% of the composition. The only exception is the final stretto passage, which occurs 63% of the way through the fugue. This passage, Passage 4, includes three entries (one in each voice of this three-voice fugue), with one of these entries being melodically inverted and the other being augmented. Passages A, B, and C exclusively use a time-interval which is precisely the length of the shorter subject, which is two beats (it is one beat when the subject is used in diminution). Passage A starts at the very beginning of the fugue and includes all three entries of the exposition. There is a measure or less of other material between each of these passages. Passage 1 begins one beat after the conclusion of Passage C, and Passage 2 begins half a measure after the end of Passage 1. This kind of subject density would be more typically

expected near the end of the fugue. This fugue, along with the previous one, both counter the notion that stretto in the exposition indicates a "stretto fugue."

Third, the remaining fugue to be discussed that has stretto in the exposition, and the only fugue that undoubtedly contains stretto in the exposition, does fit the descriptions of a stretto fugue. In this respect, the Fugue in D Major from Book II (BWV 874) is the only fugue in the *WTC* that undoubtedly has stretto occurring in the exposition. It is also permeated with stretto from the exposition to the final entry, and complies very well with all the given expectations for stretto in fugues. It is the only fugue in the *WTC* to have both more subject entries in the last stretto passage than the first, *and* a final time-interval which is shorter than the initial time interval.

In the forty-eight fugues Bach included in the *WTC*, and the twenty-one of those fugues that use stretto, stretto appears in a variety of locations and with different functional roles. This chapter has looked at a variety of ways of looking at these fugues, including location through the fugue, quantity of stretto, time-based elements of stretto, pitch-based elements of stretto, how these details relate to location within the fugue, and has touched on how stretto functions. None of the three hypotheses was strongly affirmed. The *conclusion hypothesis* has some support, with more stretto in the second half, although the final quarter does not have the most. The *quantity hypothesis* expected a difference in the number of entries depending on where in the fugue a stretto passage occurs, and which did not materialize. The *density hypothesis*, on the other hand, is strongly opposed by these data. Not only did shorter time-intervals near the end of the fugue not materialize, but exactly the opposite result appeared. These results suggest that our music-theoretical assumptions do not match Bach's compositional practice as closely as we have been led to believe.

Chapter 4

4 Conclusions

Twenty-one of the forty-eight fugues that Bach composed and included in the two books of *The Well-Tempered Clavier* include passages in stretto. There are eighty-eight passages in this corpus that meet the requirement for a stretto passage, with subject entries overlapping by one or more beats. This number accounts for the longer stretto subjects in cases with multiple possible numbers of stretto. Within these passages, there are 234 subject entries involved in stretto. Altogether, these 234 entries, 88 passages, and 21 fugues make up the primary source material for this thesis.

In Chapter 1, three hypotheses are established: the *conclusion hypothesis*, the *density hypothesis*, and the *quantity hypothesis.* These hypotheses are based on previous scholars' accounts of stretto in fugues, including discussions of the fugues of J. S. Bach. Sources from the seventeenth through to the twenty-first century discuss stretto in both prescriptive and descriptive terms as a compositional device for increasing excitement and creating climax near the end of a fugue.

The earliest authors mentioned in this literature review are the seventeenth-century musicians G.M. Bononcini and Reincken, who are cited for their promotion of stretto in these terms, as a technique for fugal composition that creates excitement and intensity.[89] German music theorists who worked in the eighteenth century, Wilhelm Marpurg and Johann Mattheson, are also cited as associating stretto with the end of fugues.[90] By the eighteenth and nineteenth centuries, the location and function of stretto was being set and conventionalized with time-intervals between entries shrinking towards the end.[91] Twentieth- and twenty-first-century music scholars have continued this tradition with discussions and definitions of stretto frequently including elements that conform to this view of stretto as occurring primarily in the latter sections of fugues, becoming more dense, intense, and weighty as the fugue proceeds, and leading to a climactic conclusion.[92]

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[89] Walker, "Stretto (i)."
[90] Sheldon, "The Stretto Principle."
[91] Horsley, *Fugue*.
[92] Benjamin, *The Craft of Tonal Counterpoint*; Martin, *Counterpoint: A Species Approach Based on Schenker's Counterpoint*; Schubert and Neidhöfer, *Baroque Counterpoint*.

These assumptions about stretto's formal location and function appear to be deeply ingrained in how stretto is discussed and have remained generally undisputed. Presenting and addressing these hypotheses constitutes a preliminary investigation into the basis of these assumptions. In Chapter 2, a new method for investigating these hypotheses generally, and this corpus of fugues specifically, is delineated.

In Chapter 3, this new method is applied to the fugues of the *WTC,* and used to investigate the *conclusion, density,* and *quantity* hypotheses. The results from this study illustrate the nature of Bach's compositional practice as it occurs in this prominent collection of fugues, although it is not possible to prove or disprove these hypotheses using these results (the corpus is not broad enough to represent the larger body of Baroque fugue and may not be representative of Bach's other fugal compositions). While these results are not conclusive in terms of larger bodies of fugues, they shed new light on this collection and open new pathways for investigation of larger corpora by providing material for future studies to build from.

This work is in a sense a pilot study which sets up an experimental design and tests it on a limited sample, allowing further studies to refine the procedure and broaden the corpus. A lack of strong claims is not an indication of a problem; rather, the contradiction set up between the hypotheses and the results indicates that the study has been successful in exposing an area of research yet to be explored.

None of the three guiding hypotheses were supported by these results. Of the three hypotheses, the *conclusion hypothesis* is the one which comes closest to being supported. This hypothesis predicts that stretto will become more frequent towards the end of a fugue, with more stretto passages in the final sections of the composition. The histogram and *t*-test that were used in Section 3.2 (Figure 5) revealed that stretto is more likely to occur in the latter half of a fugue, but not the final quarter. This hypothesis could be tested further by defining more specifically what "towards the end of a fugue" means in this context.

The *quantity hypothesis* predicts that the number of entries per stretto passage becomes higher towards the end of the fugue. No correlation was shown between the location in which a stretto passage begins and how many entries it contains. Further investigation could divide this data into smaller groups, such as dividing into groupings based on the number of stretto passages per

fugue (investigating whether fugues with more or less passages are more or less likely to conform to the *quantity hypothesis* prediction).

Inquiry into the *density hypothesis*, which predicts that time-intervals between onsets of adjacent entries within stretto passages become smaller towards the end of the fugue, produced the most intriguing results of this study. Figure 8, which plots the size of each time-interval against the location within the fugue of the stretto passage it corresponds to, is startlingly unlike the hypothetical graph this hypothesis predicts.[93] The hypothesis predicts that this graph will have a line-of-best-fit with a negative slope, with the average time-interval decreasing from low percentages through the fugue to high percentages through the fugue. Instead, Figure 8 shows a graph with a line-of-best-fit with a *positive* slope, indicating that the average time-intervals are *increasing* from low percentages in the fugue to high percentages through the fugue. This remarkable finding challenges the received wisdom and decades of scholarly discussion of stretto, and deserves further investigation.

In summary, stretto is not connected to the ending of fugues nearly as strongly as had been predicted. In the *WTC* fugues, stretto passages occur most frequently in the third-quarter, the number of stretto entries in each passage is not related to location within the fugue, and the time-intervals actually get longer as the final barline gets closer.

There are a variety of forms that this further investigation could take. One would be to adjust the method for investigating this hypothesis, or create an entirely new method, and try again. For example, the smallest time-interval in a stretto passage could be used to represent the stretto passage *in toto*. Another possibility would be to separate the existing data from this study into different groupings, such as major- or minor-mode fugues, and see if the hypothesis holds for some subsets of fugues but not others.

In a completely different direction, these results could inspire research into musical perception and memory. Collectively, these fugues are very well known, having been performed, analyzed, and appreciated by countless musicians for centuries, and stretto has been included in that discussion and deemed an important contrapuntal device. If stretto is not as strongly associated with a climactic ending as previously assumed, what led us to hold this view? Possibly music

[93] Figure 8 is shown on page 48 of this document.

theorists' understanding of stretto is based on a specific subset of fugues which use stretto in a particularly striking, memorable way. Alternatively, theorists could have learned a prototype model which conforms to these predictions, which are indeed included in definitions of stretto, and then stretto passages that do not conform are seen as less-typical, or even less stretto-like, rather than being seen as challenging the definition itself.

Another idea for further research would be to pose more specific hypotheses about how stretto is expected to function in any one particular fugue, and then identify whether they are true or false for each individual fugue. These "true or false" answers could be then compared across a corpus. This line of research could include "if . . . then . . ." types of propositions, such as *if* a fugue has stretto *then* we hypothesize that there will be stretto in the second half of the composition. This method would involve determining which predictions to make, and could involve this corpus or a different corpus.

The method established in this thesis could also be expanded to a larger corpus. The other fugues that Bach composed could be included, and it could also be expanded to include fugues by other Baroque composers or composers from other time periods. Separate studies using this method could also be conducted looking at a completely different corpus, such as a sample of nineteenth- or twentieth-century fugues, or fugues from the early Baroque. The hypotheses set from the previous scholarship discussed in Chapter 1 were that stretto would become more frequent towards the end of the fugue, the time-intervals used in stretto would become closer together, and the number of entries per passage would increase.

This thesis challenges a set of assumptions that has permeated musical-theoretical discourse, and the assumption challenges us as music scholars in return by showing us that the truth is not quite as straightforward as might have been presumed. Through this study, more questions than answers have been revealed, serving more to uncover what we do not know than confirming what we thought we knew.

Bibliography

Bach, Johann Sebastian. *Das Wohltempierte Clavier*. Edited by Franz Kroll. Bach-Gesellschaft Ausgabe, Band 14. Leipzig: Breitkopf und Härtel, 1866.

Bakulina, Olga. "The Loosening Role of Polyphony: Texture and Formal Functions in Mozart's 'Haydn' Quartets." *Intersections: Canadian Journal of Music/Intersections: Revue Canadienne de Musique* 32, no. 1–2 (2012): 7–42.

Benjamin, Thomas. *The Craft of Tonal Counterpoint*. 2nd ed. New York: Routledge, 2003.

Bullivant, Roger. "Stretto (ii)." In *Grove Music Online*. Oxford University Press, 2001. https://www.oxfordmusiconline.com/grovemusic/view/10.1093/gmo/9781561592630.001.0001/omo-9781561592630-e-0000053899.

Caplin, William E. *Analyzing Classical Form: An Approach for the Classroom*. New York: Oxford University Press, 2013.

———. *Classical Form: A Theory of Formal Functions for the Instrumental Music of Haydn, Mozart, and Beethoven*. New York: Oxford University Press, 1998.

Colman, Andrew M. *A Dictionary of Psychology*. 4th ed. New York, NY: Oxford University Press, 2015.

David, Hans T., and Arthur Mendel, eds. *Bach Reader*. 2nd rev. ed. New York: Norton, 1966.

Goetschius, Percy. *Counterpoint Applied in the Invention, Fugue, Canon, and Other Polyphonic Forms: An Exhaustive Treatment on the Structural and Formal Details of the Polyphonic or Contrapuntal Forms of Music*. Westport, Conn.: Greenwood Press, 1975.

———. *Exercises in Elementary Counterpoint*. New York: Schirmer, 1910.

Gray, Cecil. *The Forty-Eight Preludes and Fugues of J.S. Bach*. London: Oxford University Press, 1948.

Harrison, Daniel. "Heads and Tails: Subject Play in Bach's Fugues." *Music Theory Spectrum* 30, no. 1 (2008): 152–63.

Hepokoski, James A., and Warren Darcy. *Elements of Sonata Theory: Norms, Types, and Deformations in the Late Eighteenth-Century Sonata*. New York; Oxford: Oxford University Press, 2006.

Horsley, Imogene. *Fugue, History and Practice*. New York: Free Press, 1966.

Iliffe, Frederick. *Bach's 48 Preludes and Fugues Analysed for Students*. Vol. 1. 2 vols. London: Novello, 190-?.

———. *Bach's 48 Preludes and Fugues Analysed for Students*. Vol. 2. 2 vols. London: Novello, 1957.

Jeppesen, Knud. *Counterpoint: The Polyphonic Vocal Style of the Sixteenth Century*. Translated by Glen Haydon. Englewood Cliffs: Prentice-Hall, 1939.

Keller, Hermann. *Das Wohltemperierte Klavier von Johann Sebastian Bach*. London: Allen & Unwin, 1976.

Kennan, Kent. *Counterpoint: Based on Eighteenth-Century Practice*. 4th ed. Upper Saddle River, NJ: Prentice Hall, 1999.

Kennedy, Michael, and Joyce Bourne. "Stretto." In *Oxford Dictionary of Music*. Oxford University Press, 2013. https://www.oxfordreference.com/view/10.1093/acref/9780199578108.001.0001/acref-9780199578108-e-8772.

Kerman, Joseph. *The Art of Fugue: Bach Fugues for Keyboard, 1715-1750*. Berkeley, CA: University of California Press, 2005.

Kirkpatrick, Ralph. *Interpreting Bach's Well-Tempered Clavier: A Performer's Discource of Method*. New Haven: Yale University Press, 1984.

Mattheson, Johann, and Ernest Charles Harriss. *Johann Mattheson's Der Vollkommene Capellmeister: A Revised Translation with Critical Commentary*. Vol. no. 21. Ann Arbor, Mich: UMI Research Press, 1981.

Laitz, Steven G. *The Complete Musician: An Integrated Approach to Theory, Analysis and Listening*. 4th ed. New York: Oxford University Press, 2016.

Ledbetter, David. *Bach's Well-Tempered Clavier: The 48 Preludes and Fugues*. New Haven: Yale University Press, 2002.

Mann, Alfred. *The Study of Fugue*. New York: W.W. Norton, 1965.

Marpurg, Friedrich Wilhelm. "Abhandlung von Der Fuge." In *The Study of Fugue*, translated by Alfred Mann, n.d.

Martin, Henry. *Counterpoint: A Species Approach Based on Schenker's Counterpoint*. Lanham, Maryland: The Scarecrow Press, 2005.

Neumann, Werner, and Hans-Joachim Schulze, eds. *Bach-Dokumente*. Vol. 3. 4 vols. Leipzig, 1972.

Owen, Harold. *Modal and Tonal Counterpoint: From Josquin to Stravinsky*. New York; Toronto. Schirmer Books, 1992.

Parks, Richard S. *18th-Century Counterpoint and Tonal Structure*. Englewood Cliffs: Prentice-Hall, 1984.

Piston, Walter. *Counterpoint*, 1947.

Poon, Matthew, and Michael Schutz. "Cueing musical emotions: An empirical analysis of 24-piece sets by Bach and Chopin documents parallels with emotional speech." *Frontiers in Psychology* (2015). *Gale Academic Onefile* (accessed November 25, 2019). https://link.gale.com/apps/doc/A448814513/AONE?u=lond95336&sid=AONE&xid=5bdd5fa1.

Prout, Ebenezer. *Analysis of J.S. Bach's Forty-Eight Fugues (Das Wohltemperirte Clavier)*. Edited by Louis B. Prout. London: Ashdown, 1910.

———. *Counterpoint, Strict and Free*. 8th ed. London: Augener, 19?

Renwick, William. *Analyzing Fugue: A Schenkerian Approach*. Stuyvesant, NY: Pendragon Press, 1995.

———. "Structural Patterns in Fugue Subjects and Fugal Expositions." *Music Theory Spectrum* 13, no. 2 (1991): 197–218. https://doi.org/10.2307/745898.

Riemann, Hugo. *Analysis of J.S. Bach's Wohltemperirtes Clavier: (48 Preludes & Fugues). Edited by J.S. Shedlock.* 2 vols. London: Augener, 1893.

Rings, Steven. *Tonality and Transformation*. New York; Oxford. Oxford University Press, 2011.

Sauley, Kerry S., and Arthur G. Bedeian. ".05: A Case of the Tail Wagging the Distribution." *Journal of Management* 15: no. 2 (June 1989): 335-44.

Schubert, Peter, and Christoph Neidhöfer. *Baroque Counterpoint*. Upper Saddle River, NJ: Pearson Prentice Hall, 2006.

Schulenberg, David. *The Keyboard Music of J.S. Bach*. 2nd ed. New York: Routledge, 2006.

Sheldon, David A. "The Stretto Principle: Some Thoughts on Fugue as Form." *The Journal of Musicology* 8, no. 4 (1990): 553–68.

———. *Marpurg's Thoroughbass and Composition Handbook: A Narrative Translation and Critical Study*. Stuyvesant, NY: Pendragon Press, 1989.

Stevenson, Angus. "Stretto." In *Oxford Dictionary of English*. Oxford University Press, 2010. https://www.oxfordreference.com/view/10.1093/acref/9780199571123.001.0001/m_en_gb0820530.

Temperley, David, and Leigh VanHandel. "Introduction to the Special Issues on Corpus Methods." *Music Perception: An Interdisciplinary Journal* 31, no. 1 (2013): 1–3. https://doi.org/10.1525/mp.2013.31.1.1.

Walker, Paul M. "Fugue." In *Grove Music Online*. Oxford University Press, 2001. https://www.oxfordmusiconline.com/grovemusic/view/10.1093/gmo/9781561592630.001.0001/omo-9781561592630-e-0000051678.

———. "Fugue d'école." In *Grove Music Online*. Oxford University Press, 2001. https://www.oxfordmusiconline.com/grovemusic/view/10.1093/gmo/9781561592630.001.0001/omo-9781561592630-e-0000051714

———. "Stretto (i)." In *Grove Music Online*. Oxford University Press, 2001. https://www.oxfordmusiconline.com/grovemusic/view/10.1093/gmo/9781561592630.001.0001/omo-9781561592630-e-0000026948.

———. *Theories of Fugue from the Age of Josquin to the Age of Bach*. Rochester: University of Rochester Press, 2000.

Appendices

Appendix B: Stretto Tables for the twenty-one fugues of the *Well-Tempered Clavier* by J. S. Bach that use stretto

BWV 846 *Book I, C Major*	Stretto Passages (Passage #)					
	1	2	3	4	5	6
location within the form (measures)	7	10.5	14	16.25	19	24
location within the form (percentage)	25.9%	38.9%	51.9%	60.2%	70.4%	88.9%
location within the form (relative)	PE	ME	ME	ME	ME	FE
number of entries	2	2	4	4	5	2
voice order	ST	BA	ATBS	SATB	TSBST	TA
pitch-interval	-11	+12	-4/-8/+15	-4/-7/-5	+5/-8/+10/-6	+11
time-interval (beats)	1	1	1/3/2	1/2/2	1/5/1/3	2
global scale degrees of subject entries	$\hat{1}/\hat{5}$	$\hat{5}/\hat{2}$	$\hat{1}/\hat{5}/\hat{5}/\hat{5}$	$\hat{1}/\hat{5}/\hat{6}/\hat{2}$	$\hat{6}/\hat{3}/\hat{3}/\hat{5}/\hat{7}$	$\hat{1}/\hat{4}$
local starting scale-degree	$\hat{1}$	$\hat{1}$	$\hat{3}$	$\hat{3}$	$\hat{5}$	$\hat{1}$
subject modulates?	no	no	no	no	no	no
passage modulates?	no	yes	no	yes	yes	no
starting key	I	V	vi	vi	ii	I
ending key	I	vi	vi	ii	V	I
middle key(s)			I		V	
cadence proximity	none	none	before	none	none	before
cadence type			PAC			PAC
notes/commentary	Could be considered within a second exposition	Starts the eighth after another entry ends; the end is elided by one beat with another entry.	2nd entry omits last beat; 4th entry only includes first 3 beats; the end elides by one beat with Passage 4.		3rd entry truncated (only first entry); begins one sixteenth note after Passage 4 ends.	Many B♭s with a C pedal.
overall notes/commentary						

Table 1. BWV 846 Stretto Passages

BWV 849 *Book I, c# minor*	Stretto Passages (Passage #)				
	1	2	3	4	5
location within the form (measures)	64.25	84.25	92.25	102.25	107.25
location within the form (relative)	ME	ME	ME	ME	ME
location within the form (percentage)	55.9%	74.3%	80.2%	88.9%	93.3%
number of entries	2	3	10	4	2+1 in parallel 3rds
voice order	T2B	T2AB	SAT2T1T2T1AST2SB	T2AT1T2	(A+T1)T2
pitch-interval	-4	+9/-11	-3/-11/+5/-4/+5/+5/-8/+10/-12	+9/-2/-7	(-11)+(-13)
time-interval (beats)	4 (quarter notes)	4	4/4/4/4/4/4/2/2/4	4	4
global scale degrees of subject entries	$\hat{1}/\hat{5}$	$\hat{3}/\hat{4}/\hat{1}$	$\hat{1}/\sharp\hat{6}/\hat{3}/\hat{7}/\hat{4}/\hat{1}/\hat{5}/\hat{5}/\sharp\hat{7}/\hat{3}$	$\hat{1}/\hat{2}/\hat{1}/\hat{2}$	$\hat{1}+\hat{3}/\hat{5}$
local starting scale-degree	$\hat{5}$	$\hat{5}$	$\hat{1}$	$\hat{1}$	$\hat{1}+\hat{3}/\hat{5}$
subject modulates?	no	no	no	no	no
passage modulates?	yes	yes	yes	no	no
starting key	iv	VI	i	i	i
ending key	i	iv	i	i	i
middle key(s)			vii		
cadence proximity	none	none	none	none	none
cadence type					
notes/commentary	2nd subject	2nd subject	2nd subject	2nd subject	2nd subject
overall notes/commentary	voices - S, A, T1, T2, B				

Table 2. BWV 849 Stretto Passages

BWV 851 *Book I, d minor*	Stretto Passages (Passage #)				
	1	2	3	4	5
location within the form (measures)	13	17	21	27	39
location within the form (relative)	ME	ME	ME	ME	FE
location within the form (percentage)	29.5%	30.6%	47.7%	61.4%	88.6%
number of entries	2	2	3	3	2
voice order	SA	BA	BSB	SAB	BA
pitch-interval	-4	+8	+19/-14	-12/-4	+8
time-interval (beats)	3	3	3	3	3
global scale degrees of subject entries	$\hat{5}/\hat{2}$	$\hat{5}/\hat{5}$	$\hat{5}/\hat{2}/\hat{3}$	$\hat{5}/\hat{1}/\hat{5}$	$\hat{1}/\hat{1}$
local starting scale-degree	$\hat{5}$	$\hat{1}$	$\hat{1}$	$\hat{5}$	$\hat{1}$
subject modulates?	no	no	no	no	no
passage modulates?	yes	no	yes	yes	no
starting key	i	v	v	i	i
ending key	iv	v	i	iv	i
middle key(s)					
cadence proximity	none	none	beginning	none	none
cadence type			PAC		
notes/commentary	2nd entry inverted.		Alto voice resting (2-voice texture); 2nd & 3rd entries inverted; 1st entry: final note altered; 2nd entry: last note delayed.	1st entry: penultimate note extended & ornamented; 3rd entry inverted and final note altered.	
overall notes/commentary					

Table 3. BWV 851 Stretto Passages

Book I, d# minor	1	2	3	4	5
location within the form (measures)	19.5	24	27	44.5	47.75
location within the form (percentage)	22.4%	27.6%	31%	51.1%	54.9%
location within the form (relative)	ME	ME	ME	ME	ME
number of entries	2	2	2	2	2
voice order	AS	SB	SA	BS	AS
pitch-interval	+8	-14	-5	+15	+11
time-interval (beats)	2	2	2	2	2
global scale degrees of subject entries	$\hat{5}$	$\hat{2}/\hat{3}$	$\hat{1}/\hat{4}$	$\hat{5}$	¼
local starting scale-degree	$\hat{1}$	$\hat{5}$	$\hat{5}$	$\hat{5}$	$\hat{5}$
subject modulates?	no	no	no	no	no
passage modulates?	no	yes	yes	yes	yes
starting key	v	v	IV	i	iv
ending key	V	IV	III	iv	i
middle key(s)			III		
cadence proximity	beginning	beginning	end	none	none
cadence type	PAC	HC	PAC		
notes/commentary	10th note in each entry delayed by an eighth and reduced from a quarter to an eighth.	1st entry: penultimate note extended; 2nd entry truncated to first 5 beats.	First note is extended by a quarter; first entry could be considered to start on the pick-up to m. 27 as it is tied to last note of a previous subject entry.	Both entries inverted; 1st entry: last measure transposed down a second.	Both entries inverted; 1st entry: last note omitted; 2nd entry: novel rhythm starting on 4th beat (dotted quarter/eighth pattern instead of straight eighths) and truncated.
overall notes/commentary	All entries that begin with an ascending fourth (like the answer) continue with an ascending 2nd (like the subject; in the exposition, the second interval in the answer is an ascending 3rd).				

Table 4. BWV 853 Stretto Passages – continued next page

Book I, d# minor	6	7	8	9	10
location within the form (measures)	52	54	61.5	67	77
location within the form (relative)	ME	ME	ME	ME	FE
location within the form (percentage)	59.8%	62.1%	70.7%	77%	88.5%
number of entries	3	3	3	3	3
voice order	BAS	BAS	ABS	BAS	BSA
pitch-interval	+8	+8	-5/+15	+8/+4	+15/-12
time-interval (beats)	1	1	2/10	2/8	2/12
global scale degrees of subject entries	$\hat{5}$	$\hat{7}$	$\hat{2}/\hat{5}/\hat{5}$	$\hat{4}/\hat{4}/\hat{7}$	$\hat{2}/\hat{2}/\hat{5}$
local starting scale-degree	$\hat{5}$	$\hat{7}$	$\hat{2}$	$\hat{2}$	$\hat{2}$
subject modulates?	no	no	no	no	no
passage modulates?	no	no	yes	yes	no
starting key	i	i	i	III	i
ending key	i	i	iv	VI	i
middle key(s)					
cadence proximity	beginning	none	none	none	none
cadence type	HC				
notes/commentary	All three entries are truncated, ending after a measure and a half (9 notes) and excluding the 4-note tail.	All three entries are inverted and truncated, ending after a measure and a half (9 notes) and excluding the 4-note tail.	2nd entry augmented; 3rd entry inverted.	2nd entry augmented.	Last note of the first entry displaced up an octave and ornamented; second entry augmented (half speed); the first note of the third entry is shortened.
overall notes/commentary	All entries that begin with an ascending fourth (like the answer) continue with an ascending 2nd (like the subject; in the exposition, the second interval in the answer is an ascending 3rd).				

Table 4. cont.

BWV 855 *Book I, e minor*	Stretto Passages (Passage #)	
	1	2
location within the form (measures)	15	34
location within the form (relative)	ME	ME
location within the form (percentage)	35.7%	81%
number of entries	4	4
voice order	BSBS	SBSB
pitch-interval	+11/-12/+11	-12/+11/-12
time-interval (beats)	3	3
global scale degrees of subject entries	♯6̂/2̂/5̂/1̂	♯3̂/♯6̂/2̂/5̂
local starting scale-degree	3̂	3̂
subject modulates?	yes	yes
passage modulates?	yes	yes
starting key	IV	I
ending key	iv	i
middle key(s)		
cadence proximity	none	none
cadence type		
notes/commentary	second subject	second subject
overall notes/commentary	Both passages are sequences with material that only exists in these passages (arguable whether it actually is stretto).	

Table 5. BWV 855 Stretto Passages

BMW 856 *Book I, F Major*	Stretto Passages (Passage #)		
	1	2	3
location within the form (measures)	25.66	36.66	46.66
location within the form (relative)	PE	ME	ME (FE**)
location within the form (percentage)	35.6%	50.9%	64.8%
number of entries	2	3	3
voice order	BA	SAB	BAS
pitch-interval	+8	-8	+8
time-interval (beats)	6	6	6
global scale degrees of subject entries	$\hat{5}$	$\hat{3}$	$\hat{6}$
local starting scale-degree	$\hat{5}$	$\hat{5}$	$\hat{5}$
subject modulates?	no	no	no
passage modulates?	no	no	no
starting key	I	vi	ii
ending key	I	vi	ii
middle key(s)			
cadence proximity	end	none	none
cadence type	CC		
notes/commentary	1st entry is final entry of second exposition.	Sets up a PAC afterwards.	Sets up a PAC afterwards.
overall notes/commentary	**The last clearly audible subject entry is the last entry of the last stretto passage; however, there is one more ornamented entry beginning in measure 64.83.		

Table 6. BWV 856 Stretto Passages

BWV 860 *Book I, G Major*	Stretto Passages (Passage #)	
	1	2
location within the form (measures)	51	60.5
location within the form (relative)	ME	ME
location within the form (percentage)	59.3%	70.3%
number of entries	2	2
voice order	SB	AS
pitch-interval	-15	+15
time-interval (beats)	6 (one measure)	6 (one measure)
global scale degrees of subject entries	$\hat{3}$	$\hat{5}$
local starting scale-degree	$\hat{1}$	$\hat{1}$
subject modulates?	no	no
passage modulates?	yes	yes
starting key	iii	V
ending key	VII	II (V/V)
middle key(s)		
cadence proximity	before	beginning
cadence type	CC	CC
notes/commentary	First entry: first note sixteenth instead of eighth, 2nd measure omitted; second entry: 2nd and 4th measures omitted.	Both entries omit 2nd & 4th measures; 2nd entry: 3rd dotted quarter ornamented to duplicate rhythm of the first measure.
overall notes/commentary	No complete entries used in stretto.	

Table 7. BWV 865 Stretto Passages

BWV 861 *Book I, g minor*	Stretto Passages (Passage #)	
	1	2
location within the form (measures)	17	28
location within the form (relative)	ME	ME
location within the form (percentage)	50%	82.4%
number of entries	2	2
voice order	BA	ST
pitch-interval	+12	-8
time-interval (beats)	2	2
global scale degrees of subject entries	♭$\hat{7}$/$\hat{4}$	$\hat{5}$/$\hat{5}$
local starting scale-degree	$\hat{5}$	$\hat{5}$
subject modulates?	no	no
passage modulates?	yes	no
starting key	III	i
ending key	VI	i
middle key(s)		
cadence proximity	none	before
cadence type		HC
notes/commentary	2nd voice tail lowered a step.	
overall notes/commentary		

Table 8. BWV 861 Stretto Passages

BWV 864 *Book I, A major*	Stretto Passages (Passage #)	
	A	1
location within the form (measures)	1	25
location within the form (relative)	E	ME
location within the form (percentage)	1.9%	46.3%
number of entries	2	2
voice order	SA	AB
pitch-interval	-4	-5
time-interval (beats)	3 (1 measure)	1
global scale degrees of subject entries	$\hat{1}/\hat{5}$	$\hat{5}/\hat{1}$
local starting scale-degree	$\hat{1}$	$\hat{5}$
subject modulates?	no	no
passage modulates?	no	no
starting key	I	I
ending key	I	I
middle key(s)		
cadence proximity	none	none
cadence type		
notes/commentary	Includes first two entries of expo; only counts as stretto if using longer subject.	2nd entry: first note displaced; entries go farther than short subject, but end 1 beat early (halfway between end points).
overall notes/commentary	Considering two possible subject lengths.	

Table 9. BWV 864 Stretto Passages

BWV 865 *Book I, a minor*	Stretto Passages (Passage #)					
	1	2	3	4	5	6
location within the form (measures)	27.5	31.5	36.5	43	48.5	53
location within the form (relative)	ME	ME	ME	ME	ME	ME
location within the form (percentage)	31.6%	36.2%	42%	49.2%	55.7%	60.5%
number of entries	2	2	2	2	2	2
voice order	ST	AB	TA	SB	AT	BS
pitch-interval	-8	-8	+8	-15	-8	+15
time-interval (beats)	2	2	2	2	2	2
global scale degrees of subject entries	$\hat{1}$	$\hat{5}$	$\hat{1}$	$\hat{3}$	$\hat{1}$	$\hat{4}$
local starting scale-degree	$\hat{1}$	$\hat{1}$	$\hat{1}$	$\hat{1}$	$\hat{5}$	$\hat{5}$
subject modulates?	no	no	no	no	no	no
passage modulates?	no	no	no	no	yes	no
starting key	i	v	i	III	iv	♭VII
ending key	i	v	i	III	III	♭VII
middle key(s)						
cadence proximity	before	end	none	none	none	none
cadence type	PAC	IAC				
notes/commentary					Both entries inverted.	Both entries inverted.
overall notes/commentary						

Table 10. BWV 865 Stretto Passages - continued next page

BWV 865 *Book I, a minor*	Stretto Passages (Passage #)				
	7	8	9	10	11
location within the form (measures)	57.5	64.5	73	76	80.5
location within the form (relative)	ME	ME	ME	ME	ME
location within the form (percentage)	66.1%	74.1%	84%	87.4%	92.5%
number of entries	2	4	2	3	2
voice order	SA	BTSA	BA	TAS	AS
pitch-interval	-8	+5/+12/-5	+15	+9/+5	+5
time-interval (beats)	2	2/10/2	2	4/2	2
global scale degrees of subject entries	$\hat{5}$	$\hat{4}/\hat{1}/\hat{5}/\hat{1}$	$\hat{3}$	$\hat{7}/\hat{1}/\hat{5}$	$\hat{1}/\hat{5}$
local starting scale-degree	$\hat{5}$	$\hat{1}$	$\hat{5}$	$\hat{1}$	$\hat{1}$
subject modulates?	no	no	no	no	no
passage modulates?	yes	yes	yes	yes	no
starting key	i	iv	VI	♮vii	i
ending key	i	iv	♮vii	iv	i
middle key(s)	iv	i			
cadence proximity	none	before		after	none
cadence type		PAC		PAC	
notes/commentary	Both entries inverted and end early; 1st omits final 2 beats (4 notes) & 2nd omits final beat (2 notes).	3rd & 4th entries inverted; 4th entry omits last 2 beats; includes last complete entry.	Both entries inverted and omit final 2 beats (4 notes)	1st entry inverted and omits final 4 beats; 2nd entry omits final 4 beats; 3rd entry omits final 6 beats (half of the subject).	1st entry omits final 4 beats; 2nd entry omits final 6 beats; prepares for final PAC one measure later by tonicizing V.
overall notes/commentary					

Table 10 cont.

BWV 867	Stretto Passages (Passage #)
Book I, b♭ minor	1
location within the form (measures)	67.5
location within the form (relative)	FE
location within the form (percentage)	90%
number of entries	5
voice order	SAT1T2B
pitch-interval	-4/-5/-4/-5
time-interval (beats)	1 (half note)
global scale degrees of subject entries	Î/ŝ/Î/ŝ/Î
local starting scale-degree	Î
subject modulates?	no
passage modulates?	no
starting key	i
ending key	i
middle key(s)	
cadence proximity	none
cadence type	
notes/commentary	The second and fourth entries have altered tails.
overall notes/commentary	

Table 11. BWV 867 Stretto Passages

BWV 868 *Book I, B Major*	Stretto Passages (Passage #) 1
location within the form (measures)	20
location within the form (relative)	ME
location within the form (percentage)	58.8%
number of entries	2
voice order	AB
pitch-interval	-15
time-interval (beats)	6
global scale degrees of subject entries	$\hat{1}$
local starting scale-degree	$\hat{4}$
subject modulates?	no
passage modulates?	yes
starting key	V
ending key	IV
middle key(s)	I
cadence proximity	none
cadence type	
notes/commentary	First entry inverted with final note altered (final interval inverted).
overall notes/commentary	

Table 12. BWV 868 Stretto Passages

BWV 871 *Book II, c minor*	Stretto Passages (Passage #)			
	1	2	3	4
location within the form (measures)	14	16	23.5	24.75
location within the form (relative)	ME	ME	ME	ME
location within the form (percentage)	50%	57.1%	83.9%	88.5%
number of entries	3	3	2	2
voice order	SAT	AST	AS	SA
pitch-interval	-8	+5/-12	+4	-4
time-interval (beats)	0.5/3.5	2	1	1
global scale degrees of subject entries	$\hat{5}$	$\hat{1}/\hat{5}/\hat{1}$	$\hat{5}/\hat{1}$	$\hat{1}/\hat{5}$
local starting scale-degree	$\hat{5}$	$\hat{1}$	$\hat{5}$	$\hat{1}$
subject modulates?	no	no	no	no
passage modulates?	no	no	no	no
starting key	i	i	i	I
ending key	i	i	I	I
middle key(s)				
cadence proximity	before	none	before	none
cadence type	PAC		PAC	
notes/commentary	Three voice texture (no bass); 2nd entry augmented (half speed); third entry inverted with final note altered.	Three voice texture (no bass).		Includes final entry that is complete and not inverted.
overall notes/commentary	Two pairs of stretto passages (2 & 4 begin the same beat as 1 & 3 end, respectively).			

Table 13. BWV 871 Stretto Passages

BWV 872 *Book II, C# Major*	Stretto Passages (Passage #)						
	A	B	C	1	2	3	4
location within the form (measures)	1	4	7	9.25	10.75	14.5	25
location within the form (relative)	E	PE**	ME	ME	ME	ME	ME
location within the form (percentage)	2.9%	11.4%	20%	26.4%	30.7%	41.4%	71.4%
number of entries	3	6	3	3	4	4	3
voice order	BSA	SABSAB	BAS	BAS	BSAB	BSAS	SAB
pitch-interval	+12/1	-4/-12/+16/-4/-12	+8/+6	+8/+4	+15/-12/-8	+15/-12/+15	-12/-3
time-interval (beats)	2	2/2/2/1/1	2	1	1	1/1/2	0.5/1.5
global scale degrees of subject entries	$\hat{1}/\hat{5}/\hat{5}$	$\hat{1}/\hat{5}/\hat{1}/\hat{2}/\hat{6}/\hat{2}$	$\hat{5}/\hat{5}/\hat{3}$	$\hat{6}/\hat{6}/\hat{2}$	$\hat{5}/\hat{5}/\hat{1}/\hat{1}$	$\hat{3}/\hat{3}/\hat{6}/\hat{6}$	$\hat{5}/\hat{1}/\hat{6}$
local starting scale-degree	$\hat{1}$	$\hat{1}$	$\hat{1}$	$\hat{5}$	$\hat{5}$	$\hat{1}$	$\hat{5}$
subject modulates?	no	no	no	no	no	no	no
passage modulates?	no	yes	yes	yes	no	yes	no
starting key	I	I	V	ii	I	iii	I
ending key	I	V? (tonally unstable; modulating to V)	ii	I	I	V	I
middle key(s)							
cadence proximity	none	before	before	none	none	before	none
cadence type		PAC	PAC			CC	
notes/commentary	Full exposition involved; 3rd entry inverted.	First 3 entries 6 note (x+y), **possibly 2nd expo; 4th entry: dim. x + normal y; 5th & 6th entries: x only and do not overlap with each other.	All 3 entries x+y and no longer.	4-note subjects; none of the entries include y; all entries inverted.	4-note subjects; none of the entries include y; 1st and 2nd entries inverted.	2nd entry 4-note subject (just x); 1st, 3rd, & 4th entries: 6 notes (x+y); 2nd & 4th entries inverted.	4-note subjects, none of the entries include y; 1st entry inverted; 2nd entry augmented.
overall notes/commentary	A-C only include stretto of the longer subject; 1-4 are stretto with the 4-note subject; first 4 notes x, next two notes y (x+y=6-note subject; x=4-note subject).						

Table 14. BWV 872 Stretto Passages

BWV 874 *Book II, D Major*	Stretto Passages (Passage #)					
	1	2	3	4	5	6
location within the form (measures)	5	14	21	27.75	33.25	44.5
location within the form (relative)	E	ME	ME	ME	ME	FE
location within the form (percentage)	10%	28%	42%	55%	66.5%	89%
number of entries	2	2	3	2	3	3
voice order	SB	AS	TSA	BS	TAS	SAT
pitch-interval	-11	+4	+12/-5	+15	+6	-3/-10
time-interval (beats)	4 (quarter notes)	2	4/2	1	1	1
global scale degrees of subject entries	$\hat{1}/\hat{5}$	$\hat{5}/\hat{1}$	$\hat{6}/\hat{3}/\hat{6}$	$\hat{5}$	$\hat{1}/\hat{6}/\hat{4}$	$\hat{5}/\hat{3}/\hat{1}$
local starting scale-degree	$\hat{1}$	$\hat{1}$	$\hat{5}$	$\hat{5}$	$\hat{5}$	$\hat{1}$
subject modulates?	no	no	no	no	no	no
passage modulates?	no	yes	yes	no	no	yes
starting key	I	V	ii	I	IV	V
ending key	I	I	vi	I	IV	IV
middle key(s)						V
cadence proximity	none	end	none	before	before	none
cadence type		IAC		PAC	CC	
notes/commentary						
overall notes/commentary	Stretto starts on every quarter note beat.					

Table 15. BWV 874 Stretto Passages

BWV 875 *Book II, d minor*	Stretto Passages (Passage #)	
	1	2
location within the form (measures)	14	17
location within the form (relative)	ME	ME
location within the form (percentage)	51.9%	63%
number of entries	2	2
voice order	AS	AB
pitch-interval	+5	-12
time-interval (beats)	1	1
global scale degrees of subject entries	Î/$\hat{5}$	$\hat{5}$/Î
local starting scale-degree	Î	$\hat{5}$
subject modulates?	no	no
passage modulates?	yes	yes
starting key	i	i
ending key	v	iv
middle key(s)		
cadence proximity	none	none
cadence type		
notes/commentary	1st entry truncated by 3 beats; 2nd entry by 1 beat.	Both voices inverted; 1st entry truncated by 3 beats; 2nd entry by 3 beats.
overall notes/commentary	Full subject is not used intact past exposition; bass entry in exposition alters the last note.	

Table 16. BWV 875 Stretto Passages

BWV 876 *Book II, E♭ Major*	Stretto Passages (Passage #)		
	1	2	3
location within the form (measures)	30	37	59
location within the form (relative)	PE	ME	FE
location within the form (percentage)	42.9%	52.9%	84.3%
number of entries	2	2	2
voice order	TB	AS	SB
pitch-interval	-5	+4	-12
time-interval (beats)	3 (half notes)	2	2
global scale degrees of subject entries	$\hat{5}/\hat{1}$	$\hat{5}/\hat{1}$	$\hat{5}/\hat{1}$
local starting scale-degree	$\hat{5}$	$\hat{5}$	$\hat{5}$
subject modulates?	no	no	no
passage modulates?	no	no	no
starting key	I	I	I
ending key	I	I	I
middle key(s)			
cadence proximity	beginning	none	none
cadence type	PAC		
notes/commentary	PAC in V with goal reinterpreted as dominant in I.		
overall notes/commentary			

Table 17. BWV 876 Stretto Passages

BWV 878	Stretto Passages (Passage #)						
Book II, E Major	1	2	3	4	5	6	7
location within the form (measures)	9	16	19	26.75	28.25	30.25	35
location within the form (relative)	PE	ME	ME	ME	ME	ME	ME
location within the form (percentage)	20.9%	37.2%	44.2%	62.2%	65.7%	70.3%	81.4%
number of entries	4	2	2	2	2	2	4
voice order	ATBS	AS	BT	SA	TB	BA	ATBS
pitch-interval	-5/-4/+11	+5	+5	-4	-4	+11	-5/-4/+18
time-interval (beats)	2/4/2 (half note)	4	4	2	2	1	1/4/5
global scale degrees of subject entries	$\hat{5}/\hat{1}/\hat{5}/\hat{1}$	$\hat{1}/\hat{5}$	$\hat{5}/\hat{2}$	$\hat{3}/\hat{7}$	$\hat{5}/\hat{2}$	$\hat{5}/\hat{1}$	$\hat{5}/\hat{1}/\hat{5}/\hat{1}$
local starting scale-degree	$\hat{5}$	$\hat{3}$	$\hat{1}$	$\hat{6}$	$\hat{1}$	$\hat{1}$	$\hat{3}$
subject modulates?	no	no	no	no	no	no	no
passage modulates?	no	yes	yes	no	yes	no	yes
starting key	I	vi	V	V	V	I	iii
ending key	I	vi	ii	V	ii	I	I
middle key(s)		I					I
cadence proximity	before	beginning	none	end	before	none	before
cadence type	CC	PAC		PAC	PAC		PAC
notes/commentary	1st entry: 1st note shortened (delayed onset due to elisions); all 4 voices.		2nd entry: last note delayed.	Both entries use diminution.	Both entries use diminution.	1st entry dim.; last note altered.	1st & 4th: entries first note shortened; could be analysed as direct modulation to I at beginning and not a modulating passage.
overall notes/commentary							

Table 18. BWV 878 Stretto Passages

BWV 886 *Book II, A♭ Major*	Stretto Passages (Passage #) 1
location within the form (measures)	41
location within the form (relative)	ME
location within the form (percentage)	82%
number of entries	2
voice order	TB
pitch-interval	-5
time-interval (beats)	6
global scale degrees of subject entries	$\hat{5}$/$\hat{1}$
local starting scale-degree	$\hat{5}$
subject modulates?	no
passage modulates?	yes
starting key	I
ending key	iv
middle key(s)	
cadence proximity	none
cadence type	
notes/commentary	The entries are overlapped by 3 beats; the 6th note of the 1st entry is raised to briefly tonicize V
overall notes/commentary	

Table 19. BWV 886 Stretto Passages

BWV 893 *Book II, b♭ minor*	Stretto Passages (Passage #)						
	1	2	3	4	5	6	7
location within the form (measures)	27	33	67	73	80	89	96
location within the form (relative)	PE	ME	ME	ME	ME	ME	FE
location within the form (percentage)	26.7%	32.7%	66.3%	72.3%	79.2%	88.1%	95%
number of entries	2	2	2	2	2	2	2+2
voice order	TA	SB	TS	AB	ST	BA	(S+A)(T+B)
pitch-interval	+7	-16	+9	-14	-13	+13	(-10)(-12)(-5)(-7)
time-interval (beats)	1 (half note)	1	1	1	1	1	1
global scale degrees of subject entries	$\hat{1}$/♮$\hat{7}$	$\hat{3}$/$\hat{2}$	$\hat{5}$/$\hat{6}$	$\hat{2}$/$\hat{3}$	$\hat{4}$/♮$\hat{6}$	$\hat{1}$/$\hat{6}$	($\hat{3}$+$\hat{1}$)/($\hat{4}$+$\hat{6}$)
local starting scale-degree	$\hat{1}$	$\hat{1}$	$\hat{5}$	$\hat{5}$	$\hat{5}$	$\hat{1}$	$\hat{1}$+$\hat{3}$
subject modulates?	no	no	no	no	no	no	no
passage modulates?	no	no	no	no	yes	no	no
starting key	i	III	i	v	♭VII	i	i
ending key	i	III	i	v	i	i	i
middle key(s)					♭VII		
cadence proximity	none	none	beginning	none	none	beginning	none
cadence type			IAC			IAC	
notes/commentary	2nd entry starts on LT.	2nd entry starts on LT.	Both entries inverted.	Both entries inverted.	First entry inverted.	Second entry inverted.	1st pair of entries start in parallel 6ths then jump up to 3rds after 6th note; 2nd pair of entries in parallel thirds; both T & B inverted and are missing last 5 notes (1st pair of entries end after 1st pair of entries).
overall notes/commentary	Renwick says Paradigm 1 with real answer (see *Analyzing Fugue*, p. 33).						

Table 20. BWV 891 Stretto Passages

BWV 983 *Book II, b minor*	Stretto Passages (Passage #) 1
location within the form (measures)	70
location within the form (relative)	ME
location within the form (percentage)	70%
number of entries	2
voice order	AB
pitch-interval	-5
time-interval (beats)	3 (eighths; 1 m.)
global scale degrees of subject entries	$\hat{3}(\hat{5})/\hat{6}(\hat{1})$
local starting scale-degree	$\hat{3}(\hat{5})$
subject modulates?	no
passage modulates?	yes
starting key	i
ending key	iv
middle key(s)	iv
cadence proximity	none
cadence type	
notes/commentary	Both entries are missing anacruses; 1st entry only 2 measures + a downbeat long (1/3 of subject).
overall notes/commentary	

Table 21. BWV 893 Stretto Passages

Appendix C: General information about all forty eight fugues of the *Well-Tempered Clavier*, including location, key, meter, number of voices, exposition fugal-answer type, subject paradigm, number of stretto passages, and total number of measures. Italicized columns indicate fugues containing stretto.

BWV	*846*	847	848	*849*	850	*851*
WTC I or II	*I*	I	I	*I*	I	*I*
Key	*C Major*	c minor	C# Major	*c# minor*	D Major	*d minor*
Meter	*4/4*	4/4	4/4	*2/2*	4/4	*¾*
Number of voices	*4*	3	3	*5*	4	*3*
Number of separate instances of stretto	*6*	0	0	*5*	0	*5*
Real/tonal answer	*Real*	Tonal	Tonal	*Real*	Real	*Real*
Subject Paradigm	*5*	1	2a	*2*	1	*13*
Subject/Answer scale degrees	*1̂-2̂-3̂/ 5̂-6̂-7̂*	5̂-4̂-3̂/ 8̂-8̂-7̂	5̂-4̂-3̂-2̂-1̂/ 8̂-8̂-7̂-6̂-5̂	*1̂-3̂-2̂-1̂/ 5̂-7̂-6̂-5̂*	5̂-4̂-3̂/ 8̂-8̂-7̂	*1̂-2̂-3̂-4̂-5̂/ 5̂-6̂-7̂-1̂-2̂*
Total Measure Numbers	*27*	31	55	*115*	27	*44*

Table 22a (BWV 846-851)

BWV	852	*853*	854	*855*	*856*	857
WTC I or II	I	*I*	I	*I*	*I*	I
Key	Eb Major	*d# minor*	E Major	*e minor*	*F Major*	f minor
Meter	4/4	*4/4*	4/4	*3/4*	*3/8*	4/4
Number of voices	3	*3*	3	*2*	*3*	4
Number of separate instances of stretto	0	*10*	0	*2*	*3*	0
Real/tonal answer	Tonal	*Tonal*	Real	*Real*	*Tonal*	Tonal
Subject Paradigm	7a	*2a*	5	*6*	*1*	2a
Subject/Answer scale degrees	5̂-6̂-5̂/ 2̂-2̂-1̂	*5̂-4̂-3̂-2̂-1̂/ 8̂-8̂-7̂-6̂-5̂*	1̂-2̂-3̂/ 5̂-6̂-7̂	*8̂-7̂/5̂-#4̂*	*5̂-4̂-3̂/ 8̂-8̂-7̂*	5̂-4̂-3̂-2̂-1̂/ 8̂-8̂-7̂-6̂-5̂
Total Measure Numbers	37	*87*	29	*42*	*72*	58

Table 22b (BWV 852-857)

BWV	858	859	*860*	*861*	862	863
WTC I or II	I	I	*I*	*I*	I	I
Key	F# Major	f# minor	*G Major*	*g minor*	Ab Major	g# minor
Meter	4/4	6/4	*6/8*	*4/4*	4/4	4/4
Number of voices	3	4	*3*	*4*	4	4
Number of separate instances of stretto	0	0	*2*	*2*	0	0
Real/tonal answer	Tonal	Real	*Real*	*Tonal*	Tonal	Tonal
Subject Paradigm	1	2a	*11*	*1*	12a	9
Subject/Answer scale degrees	5̂-4̂-3̂/ 8̂-8̂-7̂	5̂-4̂-3̂-2̂-1̂/ 8̂-8̂-7̂-6̂-5̂	*8̂-7̂/5̂-#4̂*	*5̂-4̂-3̂/ 8̂-8̂-7̂*	5̂-6̂-5̂/ 2̂-3̂-2̂	1̂-2̂-5̂/ 5̂-5̂-1̂
Total Measure Numbers	35	40	*86*	*34*	35	41

Table 22c (BWV 858-863)

BWV	*864*	*865*	866	*867*	*868*	869
WTC I or II	*I*	*I*	I	*I*	*I*	I
Key	*A Major*	*a minor*	Bb Major	*bb minor*	*B Major*	b minor
Meter	*9/8*	*4/4*	3/4	*2/2*	*4/4*	4/4
Number of voices	*3*	*4*	3	*5*	*4*	4
Number of separate instances of stretto	*2*	*11*	0	*1*	*1*	0
Real/tonal answer	*Tonal*	*Real*	Tonal	*Tonal*	*Tonal*	Tonal
Subject Paradigm	*1*	*2a*	5	*1*	*2*	8a + 2
Subject/Answer scale degrees	*5̂-4̂-3̂/ 2̂-8̂-7̂*	*5̂-4̂-3̂-2̂-1̂/ 9̂-8̂-7̂-6̂-5̂*	1̂-2̂-3̂/ 5̂-6̂-7̂	*5̂-4̂-3̂/ 2̂-8̂-7̂*	*1̂-3̂-2̂-1̂/ 5̂-7̂-6̂-5̂*	1̂-2̂-#3̂-#4̂-5̂+3̂-2̂-1̂/5̂-5̂-#6̂-#7̂-8̂+3̂-2̂-1̂
Total Measure Numbers	*54*	*87*	48	*75*	*34*	76

Table 22d (BWV 864-869)

BWV	870	*871*	*872*	873	*874*	*875*
WTC I or II	II	*II*	*II*	II	*II*	*II*
Key	C Major	*c minor*	*C# Major*	c# minor	*D Major*	*d minor*
Meter	2/4	*4/4*	*4/4*	12/16	*2/2*	*4/4*
Number of voices	3	*4*	*3*	3	*5*	*3*
Number of separate instances of stretto	0	*4*	*7*	0	*6*	*2*
Real/tonal answer	Tonal	*Tonal*	*Tonal*	Real	*Real*	*Real*
Subject Paradigm	1	*1*	*1*	5	*1*	*2a*
Subject/Answer scale degrees	5̂-4̂-3̂/ 8̂-8̂-7̂	*5̂-4̂-3̂/ 8̂-8̂-7̂*	*5̂-4̂-3̂/ 8̂-8̂-7̂*	1̂-2̂-3̂/ 5̂-6̂-7̂	*5̂-4̂-3̂/ 2̂-8̂-7̂*	*5̂-4̂-3̂-2̂-1̂/ 9̂-8̂-7̂-6̂-5̂*
Total Measure Numbers	83	*28*	*35*	71	*50*	*27*

Table 22e (BWV 870-875)

BWV	*876*	877	*878*	879	880	881
WTC I or II	*II*	II	*II*	II	II	II
Key	*Eb Major*	d# minor	*E Major*	e minor	F Major	f minor
Meter	*2/2*	4/4	*2/2*	2/2	6/16	2/4
Number of voices	*4*	4	*4*	3	3	3
Number of separate instances of stretto	*3*	0	*7*	0	0	0
Real/tonal answer	*Tonal*	Real	*Real*	Real	Tonal	Tonal
Subject Paradigm	*4*	5	*2*	1	1	1
Subject/Answer scale degrees	*1̂-5̂-1̂/ 5̂-1̂-5̂*	1̂-2̂-3̂/ 5̂-6̂-7̂	*1̂-3̂-2̂-1̂/ 5̂-7̂-6̂-5̂*	5̂-4̂-3̂/ 8̂-8̂-7̂	5̂-4̂-3̂/ 8̂-8̂-7̂	5̂-4̂-3̂/ 8̂-8̂-7̂
Total Measure Numbers	70	*46*	*43*	86	*99*	*85*

Table 22f (BWV 876-881)

BWV	882	883	884	885	*886*	887
WTC I or II	II	II	II	II	*II*	II
Key	F# Major	f# minor	G Major	g minor	*Ab Major*	g# minor
Meter	2/2	4/4	3/8	3/4	*4/4*	6/8
Number of voices	3	3	3	4	*4*	3
Number of separate instances of stretto	0	0	0	0	*1*	0
Real/tonal answer	Real	Tonal	Tonal	Tonal	*Tonal*	Real
Subject Paradigm	1	2a	1	1	*1*	5
Subject/Answer scale degrees	$\hat{5}$-$\hat{4}$-$\hat{3}$/ $\hat{8}$-$\hat{8}$-$\hat{7}$	$\hat{5}$-$\hat{4}$-$\hat{3}$-$\hat{2}$-$\hat{1}$/ $\hat{8}$-$\hat{8}$-$\hat{7}$-$\hat{6}$-$\hat{5}$	$\hat{5}$-$\hat{4}$-$\hat{3}$/ $\hat{8}$-$\hat{8}$-$\hat{7}$	$\hat{5}$-$\hat{4}$-$\hat{3}$/ $\hat{8}$-$\hat{8}$-$\hat{7}$	*$\hat{5}$-$\hat{4}$-$\hat{3}$/ $\hat{8}$-$\hat{8}$-$\hat{7}$*	$\hat{1}$-$\hat{2}$-$\hat{3}$/ $\hat{5}$-$\hat{6}$-$\hat{7}$
Total Measure Numbers	84	70	72	84	*50*	143

Table 22g (BWV 882-887)

BWV	888	889	890	*891*	892	*893*
WTC I or II	II	II	II	*II*	II	*II*
Key	A Major	a minor	Bb Major	*bb minor*	B Major	*b minor*
Meter	4/4	4/4	3/4	*3/2*	2/2	*3/8*
Number of voices	3	3	3	*4*	4	*3*
Number of separate instances of stretto	0	0	0	*7*	0	*1*
Real/tonal answer	Real	Tonal	Tonal	*Real*	Real	*Tonal*
Subject Paradigm	1	1	5	*1*	3a	*1*
Subject/Answer scale degrees	$\hat{5}$-$\hat{4}$-$\hat{3}$/ $\hat{8}$-$\hat{8}$-$\hat{7}$	$\hat{5}$-$\hat{4}$-$\hat{3}$/ $\hat{8}$-$\hat{8}$-$\hat{7}$	$\hat{1}$-$\hat{2}$-$\hat{3}$/ $\hat{5}$-$\hat{6}$-$\hat{7}$	*$\hat{5}$-$\hat{4}$-$\hat{3}$/ $\hat{8}$-$\hat{8}$-$\hat{7}$*	$\hat{5}$-$\hat{6}$-$\hat{7}$-$\hat{8}$/ $\hat{1}$-$\hat{3}$-#$\hat{4}$-$\hat{5}$	*$\hat{5}$-$\hat{4}$-$\hat{3}$/ $\hat{8}$-$\hat{8}$-$\hat{7}$*
Total Measure Numbers	29	28	93	*101*	104	*100*

Table 22h (BWV 888-893)

Curriculum Vitae

Name:	Kathryn McDonald
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