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On J. S. Bach's Compositional Technique*

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Proportioning as a Compositional Tool

The perspective of compositional technique circumscribes the problem of musical form in a specific way: how is form being produced, and how is the production process being controlled? The answer I offer reads: by means of proportioning. At this very moment, I emphasise that, in the present context, proportioning is to be understood exclusively as a compositional tool to produce form, in particular to produce the durational segmentation and the functional differentiation in the course of a musical piece. The theological and philosophical, political and social implications of the procedure can rest for the time being. Proportioning as a tool does not intend to superimpose a sublime meaning, transcending the compositional fact; proportioning is satisfied with producing the compositional fact of form. A piece of music is not the means to represent proportioning. Rather, proportioning is a means to produce a piece of music. Despite all misinterpretations, I emphasise for a certainty: proportioning is not the end, but the means. The end of the means of proportioning is the accomplished composition. If proportioning were an end, namely the materialisation of an idea (as it would be according to the Pythagorean-Platonic tradition), then each divergence of the materialisation would mean an adulteration and the collapse of the system. As a tool, on the other hand, its validity is limited to a definite task. Once this task has been fulfilled, other tools are introduced for other tasks. They, in turn, have the right to change the proportioning in fulfilling their particular tasks. Proportioning can be compared with a geometric delineation in

architecture. Its lines cannot be built simply because walls demand a certain thickness. Even though the measurements of the delineation have to be matched to the constructive necessities, they persist in constituting the foundation for the dimensions of the realised building.

The condition of form is the decisive question from a music-theoretical point of view. Is form only and at all times to be understood as a product of a thematic process, or do other procedures exist which produce form? Serial music in particular opened the perspective on alternatives to the thematic process. An understanding of form as a product of a thematic process implies a one-sided fixation on the thematic material: it defines form as a function of this material. But, according to the present approach, the thematic process does not at all remain detached. Rather, proportioning offers a formal frame for the material elaboration of the thematic process. Both interrelate and are able to react flexibly to each other. Proportioning does not determine the material elaboration, but it opens up a space where the elaboration can unfold on its own account. Certainly, proportioning obligates the elaboration to desist from arbitrariness, and to fill the available space with a coherent context, which is musically meaningful. Proportioning enables coherent context, but it does not guarantee it. Those interested may look at the interrelation of formal proportioning and material elaboration in the Aristotelian-scholastic tradition under the keyword *universalia in re*. In any case, the knowledge of proportioning enables valid statements concerning the formal condition of a piece, which cannot be achieved in any other way.

As an example for illustrating how proportioning functions, I choose the three-part fugue in A major (BWV 888/2) of the second volume of *The Well-Tempered Clavier* (*WTC*). Its basic pattern includes 4 × 2 = 8 entries, that is eight times the duration of the subject which lasts three half-bars, or eight thematic units. The same number of non-thematic units has been added. Consequently, the basic pattern balances thematic and non-thematic time. This balance, however, is unspecific due to its high degree of generality. Therefore, it demands individualisation. This individualisation is achieved by processing the basic pattern, at first by dividing the eight thematic units and the corresponding non-thematic units into two halves, then by augmenting the thematic units of the first half by two, the non-thematic units of the second half by one, and thus the whole piece by three units (see Table 1).

Table 1: Fugue in A major, *WTC* II (BWV 888/2): Basic proportional pattern and its individualisation

	1st Half	2nd Half	Sums
Thematic	4+2	4	8+2
Non-Thematic	4	4+1	8+1
Sums	8+2	8+1	16+3

As a result of this process the first half relates to the second half as the thematic time to the non-thematic time. Duration and thematic structure, segmentation and functional differentiation correspond. The durational and functional areas coincide: they exhibit conformity in proportion. Since this conforming proportioning concerns two layers, which are superimposed within the piece, it cannot be an unintentional effect of the compositional act. On the contrary, it requires a plan, or, to put it with poignancy: it results intentionally. This corroborates the conviction: proportioning is a compositional tool.

Each half of the scheme can be subdivided, thereby clarifying its inner structure (see Table 2). The three-part fugue in A major of the second volume of the *WTC* is not the only fugue that is based on this proportional pattern. The same pattern is valid for the four-part fugue in F minor of its first volume, except for the unit of the subject lasting three bars instead of three half-bars (BWV 857/2). A comparison of these two fugues proves the remarkable difference in material elaboration permitted of the same proportional pattern. Procedural steps referring to the lower level of bars or half-bars continue the procedural steps referring to the higher level of the duration of the subject, namely the thematic units—the lower level implying less structural but more pragmatic weight. Concerning the fugue in A major, a non-thematic half-bar of the first subdivision of the first half is given to its second subdivision. The last half-bar with the final of the concluding cadence completes the quaver rest of the beginning, and therefore will not be counted. Incidentally, the proportioning and the procedure of processing it is by no means a question of arithmetic. On the contrary, the numbers are a shorthand notation of musical facts, and they are trusted to be understood this way. Within the formal frame, the material elaboration of this fugue performs a twofold development, which can be understood as an intensification, on the one hand in the area of the thematic entries by the varying contrapuntal furnishing, on the other hand in the area of non-thematic time by processing the last half-bar of the subject, using changing devices.

Table 2: Fugue in A major, *WTC* II (BWV 888/2): Inner structure of the halves

	1st Half		2nd Half		Sums
	1st Sub-division	2nd Sub-division	1st Sub-division	2nd Sub-division	
Thematic	4	0+2	2	2	8+2
Non-Thematic	4–2	0+2	2+1	2	8+1
Sums	8–2	0+4	4+1	4	16+3

A second example is the basic proportional pattern of the six-part Ricercar of the *Musical Offering* (BWV 1079/2). The values in the chart below refer to bars containing four minims. The last bar of the piece, bar 103, will not be considered from the aspect of proportioning, since the final of the subject always exceeds its proportional length of four bars. Therefore, the concluding note of the last

thematic entry, which terminates the piece, necessitates its special measure for pragmatic reasons; but in fact, it is a structural surplus (see Table 3).

Table 3: Six-part Ricercar of the Musical Offering (BWV 1079/2): Basic proportional pattern

	1st Part	2nd Part	Sums
Thematic	24	24	48
Non-Thematic	15	39	54
Sums	39	63	102

Apart from the sums of the thematic and non-thematic areas, these numbers belong to an excerpt of the later so-called Fibonacci series, multiplied by three. I am aware that with this statement I incur judgement of Ruth Tatlow.[1] However, I have only respected the segmental and functional differentiation Bach has applied to the piece, and have counted and summed up the bars. The compositional goal, which Bach was pursuing with this series of numbers, is obvious. The subject, lasting four bars of four minims, enters, according to the number of voices, six times in each of the two parts. The resulting periodicity of the thematic entries is balanced by the aperiodicity of the non-thematic segments. As otherwise, it would be possible to achieve this aperiodicity of the non-thematic segments based on the equal distribution of thematic and non-thematic time, but only in a secondary way. The so-called Fibonacci series, however, exhibits the necessary requirements in a primary way. It combines the (even continual) proportioning with aperiodicity, and it does this with integer numbers, corresponding to whole bars as an indispensable prerequisite for the possibility of managing a proportion compositionally. In the light of this obvious goal, questions as to how Bach knew of the so-called Fibonacci series, what he called it, and whether or not he connected any connotations or philosophical interpretations to it, are rendered irrelevant. Bach was not a historian of mathematics, but a composer, and what mattered to him was the compositional benefit of this number series. It also enabled the formation of two parts with a corresponding number of thematic entries, the non-thematic time falling behind the thematic time in the first part and surpassing it in the second part. The proportioning of the six-part Ricercar in line with the so-called Fibonacci series, which I observed and mentioned for the first time some thirty years ago, did not happen by chance, but was designed on purpose.[2]

[1] Ruth Tatlow, 'The Use and Abuse of Fibonacci Numbers and the Golden Section in Musicology Today', *Understanding Bach*, 1 (2006), 69–85.

[2] Concerning the six-part Ricercar, see Ulrich Siegele, 'Erfahrungen bei der Analyse Bachscher Musik', in Reinhold Brinkmann (ed.), *Bachforschung und Bachinterpretation heute. Wissenschaftler und Praktiker im Dialog: Bericht über das Bachfest-Symposium 1978 der Philipps-Universität Marburg* (Leipzig: Neue Bachgesellschaft, 1981), 137–45; Ulrich Siegele, 'Bachs Ort in Orthodoxie und Aufklärung', *Musik und Kirche*, 51/1 (1981), 3–14; Ulrich Siegele, *Bachs theologischer Formbegriff und das Duett F-Dur: Ein Vortrag* (Stuttgart: Hänssler, 1978); abridged English translation by Alfred Clayton, 'Bach's Theological Concept of Form and the F Major Duet', *Music Analysis,* 11/2–3 (1992), 245–78; Ulrich Siegele, 'Schöpfungs- und Gesellschaftsordnung in Bachs Musik',

Concerning the fugues of the *WTC*, it surprises me how rarely people are disturbed by the fact that the subject of so many fugues (half of them in each volume) does not undergo any contrapuntal procedures. Since Marpurg, contrapuntal devices had been accepted as a common characteristic of a good fugue. Are the fugues belonging to the other half therefore bad fugues? Joseph Groocock, thanks to his systematic approach, makes a point of this widely unrecognised and even unknown problem. He perceives the first two fugues of the first volume as representatives of two types, the first type being a stretto fugue without episodes, the second type being an episodic fugue without strettos. Most of the fugues of the two volumes tend towards the one or the other type. However, the two principles of stretto and episode do not oppose each other, as they blend in some fugues. David Ledbetter, a student of Groocock's, refers to Marpurg's distinction of *fuga obligata* and *fuga libera* when describing both types (Marpurg, however, having directed his distinction towards Bach and Handel). Ledbetter also connects the *fuga libera* with the ritornello form of the concerto originating in Vivaldi.[3]

My suggestion for a solution follows a similar path. Bach cultivated two different types of fugue. One was the traditional kind. This kind of fugue employs a contrapuntal definition of its formal segments. Its characteristics include augmentation or diminution of the subject, stretto, contrapuntal addition of a certain number of other voices in certain note values and certain registers, also with certain figures, and so forth. The other kind resulted from Bach's occupation with ritornello form, but earlier than Vivaldi's. This occupation made Bach aware of the imperfection of the treatment of keys and episodes in fugues, especially for keyboard instruments. Therefore, he took advantage of the organisational procedures he found in the ritornello form by expanding the scale degree order of the thematic entries beyond *dux* and *comes*, and by aiming at a balanced relationship of thematic and non-thematic time. He regarded thematic

in Heribert Gauly et al. (eds.), *Im Gespräch: der Mensch. Ein interdisziplinärer Dialog: Joseph Möller zum 65. Geburtstag* (Düsseldorf: Patmos, 1981), 276–85. For discussions concerning proportioning in Monteverdi, see Ulrich Siegele, 'Cruda Amarilli, oder: Wie ist Monteverdis "seconda pratica" satztechnisch zu verstehen?', *Claudio Monteverdi: vom Madrigal zur Melodie* (Munich: Edition Text + Kritik, 1994), 31–102; for proportioning in Schütz, see Ulrich Siegele, 'Musik als Zeugnis der Auslegungsgeschichte: Heinrich Schützens Motette "Die mit Tränen säen" aus der *Geistlichen Chormusik*', *Schütz-Jahrbuch,* 4–5 (1982/83), 50–6; for proportioning in Beethoven, see Ulrich Siegele, *Beethoven: Formale Strategien der späten Quartette* (Munich: Edition Text + Kritik, 1990), and Ulrich Siegele, 'Klaviersonate C-Dur "Waldsteinsonate" Op. 53 (zusammen mit dem Andante favori F-Dur WoO 57)', in Albrecht Riethmüller, et al. (eds.), *Beethoven. Interpretationen seiner Werke,* I (Laaber, 1994), 370–9.

[3] Joseph Groocock, *Fugal Composition: A Guide to the Study of Bach's '48',* ed. Yo Tomita (Westport: Greenwood Press, 2003), 2; David Ledbetter, *Bach's Well-tempered Clavier: The 48 Preludes and Fugues* (New Haven and London: Yale University Press, 2002), 101–3; Carl Dahlhaus, 'Bachs konzertante Fugen', *Bach-Jahrbuch*, 42 (1955), 45–72. Concerning the following paragraphs, see Ulrich Siegele, 'Kategorien formaler Konstruktion in den Fugen des Wohltemperierten Klaviers', in Siegbert Rampe (ed.), *Bach: Das Wohltemperierte Klavier I: Tradition, Entstehung, Funktion, Analyse. Ulrich Siegele zum 70. Geburtstag* (Munich: Katzbichler, 2002), 462–71, and Ulrich Siegele, 'Von zwei Kulturen der Fuge: Ritornellform und kontrapunktische Definition im Wohltemperierten Klavier von J. S. Bach', *Musik & Ästhetik,* 10/40 (October 2006), 63–9.

entries as ritornellos, non-thematic segments as episodes, and he usually assigned harmonic stations to the thematic entries, and modulations to the non-thematic segments. By doing so, proportioning became part of the fugue, since, as far as I can see, proportioning originated in arias and especially in concertos, where it could be employed in a freer and therefore more elaborate way. By modelling fugue in accordance with ritornello form, Bach gave fugue a form, which (except for the polyphony of the texture) was independent from contrapuntal procedures, as far as they concern the subject. This is Bach's specific contribution to the theory and practice of fugue. It probably included the didactic benefit of teaching the basics of ritornello form by means of keyboard fugue.

However, Bach did not substitute the contrapuntally defined fugue with the ritornello fugue. He let both kinds coexist and manifested their equal value by assigning each kind one half of the fugues in both volumes of the *WTC*. But the contrapuntally defined fugue took over characteristics of the ritornello fugue, namely the balanced relationship of episodes and the harmonic disposition, although these never became fully integrated. On the other hand, the ritornello fugue adopted contrapuntal procedures, which did not affect the subject but the episodes. The two cultures of the contrapuntally defined fugue and the ritornello fugue approached each other, but never merged completely. Finally, Bach returned to the contrapuntal definition in the Art of Fugue—now, however, not concerning the segments of a single fugue, but concerning the sequence of self-contained fugues. He had probably sensed that in the long run it would not be the ritornello form but rather contrapuntal workmanship that would continue.

The fugue in C major of the first volume of the *WTC* (BWV 846/2), however, shows no influence of the ritornello form, except maybe for the cadence on the sixth scale degree in the middle of the piece. At any rate, it is conceived without episodes, and in this sense it is unique. At the beginning of the work, Bach presents the tradition of the contrapuntally defined fugue without any compromise, in order to oppose it programmatically with his new paradigm of a ritornello fugue through the next fugue in C minor (BWV 847/2). Without any regard to its uniqueness, the fugue in C major is used as a representative model of a Bach fugue over and over again. At times, far-reaching conclusions are being drawn, which however can claim only limited validity because of the unique status of the specimen. The opinion has been voiced that the succession of the contrapuntal devices is not coherent, but sauntering around in a circle. Even if this should be true in the case of the present fugue, the opinion can be confronted with other fugues, which in this regard follow a straight, arrow-like line.

In a study on the fugue in C minor of the first volume of the *WTC*, I have undertaken to represent the structural layers of the piece as genetic stages, and have actually elaborated these stages for opening up the structural layering to the aesthetic perception in this special case.[4] Later, the least conspicuous, if not problematic, form of the three-part Ricercar of the *Musical Offering* (BWV 1079/1)

[4] Ulrich Siegele, 'Zur Analyse der Fuge c-Moll aus dem ersten Teil des Wohltemperierten Klaviers', *Cöthener Bach-Hefte,* 4 (1986), 101–36; English translation by Don O. Franklin, 'The Four Conceptual Stages of the Fugue in C Minor, WTC I', in Don O. Franklin (ed.), *Bach Studies* (Cambridge: Cambridge University Press, 1989), 197–224.

which is a ritornello fugue just like the six-part Ricercar, induced me to investigate how the real situation, which gave rise to a musical piece, can influence its compositional outcome. I envisage the three-part Ricercar as a conversation between Bach and Frederick II, king in Prussia, about their musical and social interrelationship. Bach, in this artistic dialogue, claims equality of aesthetic and political action, similar to Beethoven with his Eroica Symphony.[5]

In denoting the harmonic disposition of the thematic entries, I prefer numbers peculiar to the scale degree. It is often possible to interpret the order of degrees functionally, especially when the *dux* on the first and the *comes* on the fifth scale degrees are supplemented by the two relative keys with identical scales, but changing mode. However, there are always degree successions that can only be understood by the notion of modality. Therefore, I advocate the neutral designation by scale degrees, which leaves a functional interpretation to discretion, but does not exact it automatically. Incidentally, it is my opinion that with regard to harmonic progressions in Bach's music, at least in his fugues, the dominant of the dominant of a key should be named differently. It rather concerns one of the many appearances of the fourth scale degree (in functional interpretation the subdominant), in this case by raising the fundamental note and substituting the interval of the fifth by the interval of the sixth. Furthermore, the third scale degree, if not accompanied by the sixth scale degree in major or the seventh scale degree in minor, should not be understood as relative of the dominant or the tonic respectively, but, as current in English (but also in Schönberg's) terminology, as the mediant, namely as the triad based on the middle note of the tonic triad, and the third in the order of precedence, following the tonic and the dominant.

Sequence building, particularly the sequence of falling fifths, demands a special interest, this being true not only regarding fugues, but also in general. On the one hand, the sequence of falling fifths, especially when forming a complete circle, serves the representation of a key, in which case time passes, without harmonic progression, the corresponding initial and final degrees, however, changing from a weak to a strong or from a strong to a weak position. On the other hand, the sequence of falling fifths serves as a means of modulation if one (or rarely several) changes of the basic scale take place in its course.

Apart from some insignificant exceptions, bar numbers belong to the many and diverse ordering factors of structured arrangements comprising combinations of two or more movements, especially in instrumental music, but also in the B minor Mass. The concern, however, is not primarily the bar numbers of single, individual pieces, but the sums, which develop from groups of pieces, as well as averages that can be drawn from these sums. The meaning of these numbers becomes clear when they are distributed into their structural components, namely in basic numbers as well as in large or structural and small or pragmatic modifications. Starting with the foundation of the basic numbers, modifications allow a sensible reaction to composition-technical as well as

[5] Ulrich Siegele, 'Technik des Komponisten vor der Größe des Herrschers: Das dreistimmige Ricercar aus dem "Musikalischen Opfer" von J. S. Bach', in Wolfgang Ruf (ed.), *Musik als Klangrede: Festschrift Günter Fleischhauer* (Cologne: Böhlau, 2001), 156–93.

external requirements. Therefore, bar numbers are not an abstract, irrevocable precondition. They are rather a flexible technical aid and an instrument of control. They provide information about two compositional parameters: the sum total according to which a structured arrangement is contrived, and the imagined standard values on which the combinations of movements as well as single pieces, possibly of different kind, are based.

A specific aspect of this procedure is that bar numbers establish a connection to the general measurement of time, with the common index of 162 bars of any metre corresponding to 7 ½ minutes (formerly a common subdivision value of time). This correspondence relates neither to the actual duration of performance, nor to the composed duration. It should rather be seen as the dispositional duration, which serves as an orientation for the outline. A frequently chosen basic value is 1944 bars, which aim at 90 minutes. Normative notions regarding the extent of structured arrangements, combinations or pairs of movements, and single movements as well shaped the frame, in which Bach's compositional activities unfolded. These investigations also enable a new view on the genesis and the intended final state of the Art of Fugue. Incidentally, such use of bar numbers can be shown for other composers as well.[6] While my interest in the significance of bar numbers is directed at the outline of a structured arrangement and its components, Ruth Tatlow in her 'Theory of Proportional Parallelism' is concerned with the final result of the compositional process. Numerical correspondences within the succession of movements, within collections and even among different collections tend towards round numbers and simple proportions of bars.[7]

[6] Ulrich Siegele, 'Taktzahlen als Ordnungsfaktor in Suiten- und Sonatensammlungen von J. S. Bach: Mit einem Anhang zu den Kanonischen Veränderungen über *Vom Himmel hoch*', *Archiv für Musikwissenschaft*, 63 (2006), 215–40; Ulrich Siegele, 'Taktzahlen als Schlüssel zur Ordnung der Klavierübung III von J. S. Bach: Ein Vorschlag für die Aufführung', *Musik und Kirche*, 76 (2006), 344–51; Ulrich Siegele, 'Some Observations on the Formal Design of Bach's B-minor Mass, in Yo Tomita, Robin A. Leaver and Jan Smaczny (eds.), *Exploring Bach's B-Minor Mass* (Cambridge: Cambridge University Press, 2013), 107–24; Ulrich Siegele, 'Taktzahlen der Präludien und Fugen in Sammlungen mit Tastenmusik von J. S. Bach, in Reinmar Emans and Wolfram Steinbeck (eds.), *Bach und die deutsche Tradition des Komponierens: Wirklichkeit und Ideologie, Festschrift Martin Geck zum 70. Geburtstag* (Dortmund: Klangfarben, 2009), 77–107; Ulrich Siegele, 'Zum Aufbau von Telemanns Passionsoratorium *Seliges Erwägen*', in Martina Falletta et al. (eds.), *Georg Philipp Telemanns Passionsoratorium 'Seliges Erwägen' zwischen lutherischer Orthodoxie und Aufklärung: Theologie und Musikwissenschaft im Gespräch* (Frankfurt: Haag & Herchen, 2005), 125–55; Ulrich Siegele, 'Johann Ulrich Steiglederss "Ricercar Tabulatura" (1624) als Kunstbuch: Eine Einführung in Formprinzipien imitatorischer Tastenmusik', *Schütz-Jahrbuch*, 28 (2006), 157–206 (NB on p. 205, line 1, the two figures should be changed into 210 and 105); Ulrich Siegele, *Johann Ulrich Steiglederss Vaterunser-Variationen (1626/27): Eine Kunst der organistischen Choralbearbeitung im Spannungsfeld zwischen ober- und niederdeutscher Tradition* (Stuttgart: Cornetto, 2012); Ulrich Siegele, 'Wie unvollständig ist Bachs "Kunst der Fuge"?', in Winfried Hoffmann and Armin Schneiderheinze (eds.), *Bericht über die Wissenschaftliche Konferenz zum V. Internationalen Bachfest der DDR in Verbindung mit dem 60. Bachfest der Neuen Bachgesellschaft Leipzig 1985* (Leipzig: VEB Deutscher Verlag für Musik, 1988), 219–25.

[7] Ruth Tatlow, 'Bach's Parallel Proportions and the Qualities of the Authentic Bachian Collection', in Reinmar Emans and Martin Geck (eds.), *Bach oder nicht Bach? Bericht über das 5. Dortmunder Bach-Symposion 2004* (Dortmund: Klangfarben, 2009), 135–56; Ruth Tatlow,

Time Structure

In conclusion, I would like to discuss an area of compositional technique which on the one hand leads into the inner condition of Bach's music (maybe more than any other area), but on the other hand is highly controversial: the structure of time. Methodically, the investigation originates in characteristics such as metre, layering of note values in upper, middle and fundamental voices, rhythm of changing harmonies and metre of textual declamation in relationship to the framework of musical metre. A classification of Bach's compositional output in consideration of these characteristics creates a synoptic view of movement types. Apart from their chronological layering, these characteristics are marked more distinctly in ensemble music; in soloistic music, however, they are more individualised. Therefore, the success of an investigation depends mainly on the correct diagnosis of the movement types, for whose differentiation analytical tools are yet to be developed, for the most part. Already a preliminary inspection reveals the compositional connection of such types, for example the connection of the recitative with the chorale, where two declamatory units of the recitative (namely two quavers) usually equal one declamatory unit of the chorale (namely one crotchet). Or the connection of the chorale with the Siciliana and the Pastorale, if the declamatory unit of a crotchet in the chorale is divided into three quavers instead of two and thus notated as a dotted crotchet. The task consists in combining such particular connections to a comprehensive network, where each movement type occupies a definite place and each piece of the compositional output participates in a specific movement type.

At this point, it seems reasonable to assign a certain tempo to each movement type. In this sense, the concern is the composed tempo. Tempo is not unconditionally submitted to the competence of performance. Rather, it is an indispensable quality of composition and therefore a criterion for performance, just as much as the other notated parameters. Tempo as an integral constituent of composition is a representative signature for the sum of all the structural time characteristics, essential to a defined movement type. Inasmuch, my approach is related to Rudolf Kolisch's investigations into tempo and character in Beethoven's music around 70 years ago; Erwin Bodky's proposals regarding tempi in Bach's keyboard music are a result of similar considerations.[8] The interrelationship between tempo and movement types, rooted in the characteristics of time structure, results in the fact that tempo is ordered in types, namely in specific degrees, as well. These tempo degrees are related to each other proportionally, justified by the network of movement types.

'Parallel Proportions, Numerical Structures and *Harmonie* in Bach's Autograph Score', in *Exploring Bach's B-minor Mass*, 142–62; Ruth Tatlow, *Bach's Numbers: Compositional Proportion and Significance* (Cambridge: Cambridge University Press, 2015).

8 Rudolf Kolisch, 'Tempo and Character in Beethoven's Music', *The Musical Quarterly,* 29 (1943), 169–87 and 291–312; Rudolf Kolisch, *Tempo und Charakter in Beethovens Musik* (Munich: Edition Text + Kritik, 1992); Rudolf Kolisch, 'Tempo and Character in Beethoven's Music', *The Musical Quarterly,* 77 (1993), 90–131 and 268–342; Erwin Bodky, *The Interpretation of Bach's Keyboard Works* (Cambridge, MA: Harvard University Press, 1960).

The decided concern in types is due to a change in the comprehension of time. The younger concept of time determines the duration of the unit, the beat. It adds beat units to bars, and bars to theoretically infinite musical pieces. Its symbol is the pendulum clock, its instrument the metronome. The older concept determines the overall duration of time, limited by the musical piece itself, the special occasion, or in general (and conforms to the original sense of the word, which is documented in the antonym of 'time and eternity'). It divides this finite time into the number of contained bars. Its symbol is the hourglass. The younger kind is able to change the tempo continuously, at least in imagination (although the scale of the metronome divides the minute step by step). The older kind changes the tempo in proportional degrees. It is tied to the cycle of the liturgical year, to reiteration and model. The younger kind relates to the secularised progress, unexpected newness, the individual and the original genius.[9]

This interpretation has been touched by thoughts Karol Berger expressed in a publication with the title *Bach's Cycle, Mozart's Arrow*.[10] It seems, however, that the change in the comprehension of time, though prepared long ago, was only completed at the end of the early modern period, taking place in the span between the French Revolution in 1789 and the Viennese congress in 1814–1815. This span also included the end of the old German Empire. As late as 1802, Heinrich Christoph Koch (based on Jean-Jacques Rousseau, and differing from Johann Joachim Quantz's four-degree scale) was able to order tempi gradually in five principal types, sufficient for the correct motion of each musical piece without much noticeable deviation.[11] And even the metronome markings which Beethoven added in 1817 to his Eroica Symphony—the work written during the decline of the old Empire and, by its compositional stature, programmatically enunciating the revolutionary claim of the symphonic genre appertaining to the high style—are still proportionally organised. The dotted minims of the first movement equal 60, the quavers of the second movement 80, the dotted minims of the third movement 116, and the minims of the fourth movement 76, turning later to quavers equalling 108, and finally to crotchets equalling 116. It should be allowed, in accordance with Koch, to view 116 as a minimal deviation from 120, and 76 as a minimal deviation from 80. Only 108 could be assessed as a noticeable retardation of 120. Looking at the numbers this way, the metronome markings of

9 Ulrich Siegele, 'Vortrag', *MGG* Vol. 14, 16–31. For a another approach to questions of tempo and proportion, see the articles of Don O. Franklin, for example: Aspekte von Proportion und Dimension in Johann Sebastian Bachs Missa von 1733', in Ulrich Leisinger (ed.), *Bach in Leipzig – Bach und Leipzig: Bericht über die Internationale Wissenschaftliche Konferenz Leipzig, 27. bis 29. Januar 2000*, Leipziger Beiträge zur Bachforschung, 5 (Hildesheim: Georg Olms, 2002), 235–72; 'Composing in Time: Bach's Temporal Design for the Goldberg Variations', in Anne Leahy and Yo Tomita (eds.), *Bach Studies from Dublin: Selected papers presented at the ninth biennial conference on Baroque music, held at Trinity College Dublin from 12th to 16th July 2000*, Irish Musical Studies, 8 (Dublin: Four Courts, 2004), 103–28.

10 Karol Berger, *Bach's Cycle, Mozart's Arrow: An Essay on the Origins of Musical Modernity* (Berkeley: University of California Press, 2007).

11 Heinrich Christoph Koch, *Musikalisches Lexikon* (Offenbach: André, 1802), q.v. 'Zeitmaaß', 1755 et seq., and 'Adagio', 62–6; Ulrich Siegele, 'La Cadence est une qualité de la bonne Musique', in Robert L. Marshall (ed.), *Studies in Renaissance and Baroque Music in Honor of Arthur Mendel* (Kassel: Bärenreiter, 1974), 124–35.

60, 80, and 120 relate to each other as 3 : 4 : 6. (Incidentally, the first movement of the symphony belongs to the same movement type and to the same tempo degree as the first movement of Bach's fourth Brandenburg Concerto (BWV 1049/1), except that Beethoven notates note values one degree larger than Bach.) Only in 1826, in the middle of the Restoration Period, Beethoven writes: 'We are hardly able to have ordinary tempi ('*tempi ordinarij*'—note the plural) any longer, since one has to follow the ideas of the freer genius'.[12] Together with the movement types, the tempo types have disappeared.

This change is the reason why it is so difficult for us, who stand on the other side of the line, to understand the time structure of Bach's music, to make sense of it, and to accept it. The widespread lack of comprehension of such investigations into the time structure of Bach's music and its composed tempo is a result of this difficulty. The reluctance is understandable, since the issue achieves—to use a fashionable term—a deconstruction in the original sense of the notion, namely a reversal of a binary hierarchic relationship, in this case of the relationship of performance and composition. A deep fear seems to be involved as well, the fear that a definition of some few tempo degrees will lead to impoverishment. However, this fear misunderstands the fact that a different mechanism of tempo determination is inherent in a different structure of time. The fixed degrees of tempo enable the composer to differentiate the perception of the same tempo degree to a considerable extent by means of different densities of texture, namely the changing number and kind of its events. The composer himself has authority to determine the perception of a specific tempo degree. He does not have to leave the choice of tempo to the performer, but can establish the nuances in the composition himself. The fixed degrees of tempo are the prerequisite for the compositional stylisation of the movement types—so to speak, the foil to which stylisation has to be related. Only on this basis can the stylisation be recognised and become evident in performance. The remark that Bach usually performed his own pieces at a rather lively tempo makes sense in this context.[13] He probably adhered accurately to the fixed degrees of tempo, but the high activity and the high density of his music evoked the impression of a tempo that was faster than normal.

Incidentally, since the topic of this essay is compositional technique, a discussion of how this tempo of composition is to be transferred to practical performance is not necessary, especially since the tradition of reception is legitimate on its own, and each performance is responsible for determining its place between the unattainable limits of historicity and actuality. But I am sceptical of the common practice to slow down the tempo if the density increases, and to speed it up if the density decreases, and in that way to deviate from the tempo degree attached to a movement type. Thus, the characteristic differences are levelled off: they disappear, they blur, and they become unrecognisable. However, historical tempi can lead to new and unexpected realisations of musical

[12] Sieghard Brandenburg (ed.), *Ludwig van Beethoven: Briefwechsel Gesamtausgabe, 6: 1825–1827* (Munich: Henle, 1996), 330 (No. 2244); Emily Anderson (ed.), *The Letters of Beethoven,* 3 (London: Macmillan, 1961), 1325 (No. 1545).

[13] *BDok* VII, 30 (Forkel); *NBR*, 436; also *BDok* III, 87 (No. 666); *NBR,* 305–6 (No. 306).

pieces, as can the use of period instruments, the number of singers and players, tunings, as well as playing and singing techniques.

Four different domains contribute their traditions of genre with the inherent traditions of tempo to Bach's work: the domain of liturgical and chorale music, the domain of motet and figural music, the domain of the concerto, and the domain of dances. Presumably, each of those four domains (especially the domain of dances) possessed a specific tradition of movement and tempo types, which were not easily compatible. In Bach's work, however, these different traditions were combined into a consistent system. This demanded a process of adaptation on all sides, except perhaps for the domain of liturgical and chorale music. At the same time, it created the indispensable prerequisite for the blending of genres, which is so characteristic for Bach's work.

As far as I can see, this tempo system is based on a scale of six degrees, the terms of which relate to each other in the alternating ratios of the intervals of the fifth and the fourth, namely, 2 : 3 : 4 : 6 : 8 : 12. For the absolute fixation of this proportional scale, I refer to Michael Praetorius regarding the term 3 and to Lorenz Christoph Mizler regarding the term 4, raising their respective values of 80 and 105 bars in 7 ½ minutes (or half a quarter hour) to 81 and 108 bars in order to exactly depict the ratio of 3 : 4.[14] The origin of the scale is the term 4, whose 108 bars in 7 ½ minutes result in a metronome marking of 57.6 beats per minute. I designate this principal value of the scale, from which the proportional markings of the other terms result, with p (and no one should be offended that here, where tempo degrees of single pieces are concerned, I use another absolute fixation than earlier in this essay, where comprehensive values for structured arrangements are concerned). Experience tells us even today that tempo degrees could be achieved exactly with some practice, so much the more as no systematic possibility to find a tempo existed outside of these defined degrees. By the way, tempo degrees always refer to the basic tempo; they do not limit the variety of the performance.

Three of the terms are labelled as basic values of a domain, the term 3 for the liturgical and chorale music, the term 4 for the motet and figural music, and the term 6 for the concerto, each presupposing common 4/4 metre. Understandably, such a general basic value cannot be assigned to the domain of dances. The liturgical and chorale domain is self-contained and includes, besides chorale and recitative, also the turbae of the oratorical works; at least as long as they are marked with 4/4 metre, these turbae have to be understood (and performed) as recitatives expanded to polyphony. The motet and figural domain takes advantage of the possibilities of proportional relationships by equalising bars of different metre (or its subdivisions) on the one hand, and note values on the other. The concerto chooses among the available degrees of tempo, whereas each dance type remains attached to a characteristic tempo type. Incidentally,

[14] Michael Praetorius, *Syntagma musicum tomus tertius* (Wolfenbüttel: Holwein 1619; facsimile ed., Kassel: Bärenreiter, 1954), 87–8, English translation in *Syntagma Musicum III*, trans. and ed. Jeffery Kite-Powell (Oxford: Oxford University Press, 2004), 100; Lorenz Christoph Mizler, *Musikalische Bibliothek* (Leipzig: Mizler, 1739–1754; reprint, Hilversum: Knuf, 1966), 4/1, 108 et seq. (the figure '400' on page 109, line 4, is a paleographically understandable misprint instead of the correct figure '490').

examples exist that, in a successive combination of movements, the proportionality of tempo degrees results in a proportionality of duration—at times even in the orientation towards round values of the general time measurement. These interrelationships demand special consideration. The examples regarding these interrelationships are found in concertos, and likewise in cantatas: besides the oratorical works, the cantatas exhibit the most elaborate dispositions in Bach's compositional output, displayed on manifold layers. Here and elsewhere, structured time joins as an equally entitled ordering factor the forms of text and music (particularly the chorale as the specific formal element of Lutheran church music), keys and scoring (comprising the vocal and instrumental forces).[15] The chart below provides a general view of the system of time structure, contained in and derived from Bach's music. It should be added that the subdivision of a crotchet of the term 6 into eight demisemiquavers, and the subdivision of a quaver of the term 12 into four demisemiquavers, as it is common in soloistic zones of Bach's music, result in 11.52 beats per second, thus reaching the limit of acoustic and physiological possibilities (see Table 4).

Table 4: The System of Time Structure in Bach's Music

Term of the Scale	Ratio of the Degree	Metronome Marking	Basic Value of a Domain
12	Threefold (= 3p)	172.8	
8	Twofold (= 2p)	115.2	
6	Three Halves (= 3/2p)	86.4	Concerto
4	The Principal Value (= p)	57.6	Motet and Figural
3	Three Quarters (= 3/4p)	43.2	Liturgical and Chorale
2	The Half (= 1/2p)	28.8	

A few examples mainly taken from dance movements for keyboard instruments—the English Suites (E), the French Suites (F) along with the two Suites in A minor and E-flat major, the Partitas (P), and the French Overture—illustrate how the system of time structure operates. I disregard external statements by theorists and rely exclusively on the internal statements of Bach's

[15] Ulrich Siegele, 'Proportionierung als kompositorisches Arbeitsinstrument in Konzerten J. S. Bachs', in Martin Geck (ed.), *Bachs Orchesterwerke: Bericht über das 1. Dortmunder Bach-Symposion 1996* (Witten: Klangfarben, 1997), 159–71; and Ulrich Siegele, 'Planungsverfahren in Kantaten J. S. Bachs.' See also the earlier studies: Ulrich Siegele, 'Bemerkungen zu Bachs Motetten', *Bach-Jahrbuch*, 49 (1962), 33–57; Ulrich Siegele, 'Zur Verbindung von Präludium und Fuge bei J. S. Bach', in Georg Reichert and Martin Just (eds.), *Bericht über den internationalen musikwissenschaftlichen Kongreß Kassel 1962* (Kassel: Bärenreiter, 1963), 164–7; Ulrich Siegele, 'Von Bachschen Modellen und Zeitarten', in Georg von Dadelsen and Andreas Holschneider (eds.), *Festschrift Walter Gerstenberg zum 60. Geburtstag: im Namen seiner Schüler* (Wolfenbüttel: Möseler, 1964), 162–5; Ulrich Siegele, 'Bachs Motette "Jesu, meine Freude": Protokoll einer Aufführung', *Musik und Kirche*, 39 (1969), 170–83. Since writing the present essay in summer 2012 a more extensive study on tempo and duration in Bach's music has been published: Ulrich Siegele, *Johann Sebastian Bach komponiert Zeit: Tempo und Dauer in seiner Musik,* Vol. 1: *Grundlegung und Goldberg-Variationen* (Hamburg: tredition, 2014).

music, true to the composition-technical approach. In addition to tempo degree, the individual dance types are defined by metre. In German, the fixed combination of tempo degree and metre can be named 'Zeitart' (time species), analogous to 'Tonart' (key species). Time species is a primary concept in shaping the horizontal dimension, as key species is a primary concept in shaping the vertical dimension.

Many dance types exhibit proper tempo degrees in proper metres: the Allemande the degree p in quadruple metre; the Sarabande the same degree p, yet in triple metre; the Gavotte and the Bourrée the degree 3/2p in duple metre; the Menuet (also the Burlesca and the Polonaise) the degree 2p in triple metre; the Passepied (also the Rondeaux of Partita II) the degree 3p in triple metre; Air or Aria, Capriccio, Scherzo, and Echo the degree 3/2p, in either quadruple or duple metre. Each of the named dance types is related to one specific tempo degree only. It is not contradictory that the 'Tempo di Gavotta' movement of Partita VI has been decreased to the degree p. The sixfold subdivision values of the minims result in the same speed as the fourfold subdivision values of the minims in the Gavottes belonging to the degree 3/2p.

Courante and Gigue, however, are differentiated, the Courante into two types, namely the French and the Italian. The French type, the Courante proper, exhibits the degree p related to the minims, even if the usual time signature of 3/2 turns to 6/4 (F III). Embracing this Courante type, the first three core movements of a suite—Allemande, Courante, and Sarabande—invariably keep to the principal tempo degree p. They only differ concerning the metre (and its internal configuration). This calls attention to an issue worthwhile its special investigation: how are movement and tempo types ordered in the course of an individual suite performing its dramaturgy?

The Italian type is still missing in the English Suites. It appears for the first time in the French Suites with the questionable designation Courante, and later in the Partitas with the proper designation Corrente. This type always exhibits triple metre. However, the inner subdivision and the tempo degree vary reciprocally; their interaction aims at the maintenance of the same constant speed concerning the smallest subordinate note values in continuous motion (as has been shown in the above mentioned movement with the designation 'Tempo di Gavotta'). For comparing the speed of the smallest subordinate note values in continuous motion regarding different pieces, the speed may be related to the scale of tempo degrees through multiplying the particular tempo degree by the number of notes subordinate to the beat in the specific case. It then turns out that the range of speed of the smallest note values stretches from 3/2 for the quavers of the chorale and the recitative (namely 3/4 × 2) to 12 for the demisemiquavers in a basic concerto movement (namely 3/2 × 8), the range of speed consequently exhibiting the ratio 1 : 8.

The characteristics of the Italian Corrente rest on the constant speed of the smallest note values. For achieving the constant speed 6p varying possibilities are at hand: 3/4 metre with continuous quaver motion (F II) or 3/8 metre with continuous semiquaver motion (P V), both with the degree 3p; 3/4 metre with continuous triplet subdivision and the degree 2p (F IV and P I); 3/4 metre with

continuous semiquaver motion and the degree 3/2p (F V and F VI). The Correntes of two Partitas, the one in 3/4, the other in 3/8 metre (P III and P VI), decrease the degree from 3p to 2p in view of the fourfold subdivision of the beat resulting in continuous semi- and demisemiquaver motion respectively; on the other hand, they increase the speed of the smallest subordinate note values in continuous motion by one third in comparison with the other Correntes, namely from 6 to 8. Incidentally, just these two Partitas had already been enclosed in the Keyboard Book for Anna Magdalena Bach from 1725.

The Gigues prefer the tempo degree 2p, which always refers to the comprehensive value of the triplet subdivision, in particular to the dotted crotchet in 6/8 metre (E II and F IV) as well as in 12/8 metre (E III, E IV, and P III), to the dotted quaver in 12/16 metre (E VI and F V) as well as in 9/16 metre (P IV), and to the crotchet in 4/4 metre (P I), always leading to the speed 6p of the subdivision values. Two Gigues intensify the triplet subdivision in the ratio 2 : 1 to a dotted rhythm in the ratio 3 : 1, in particular to dotted quaver plus semiquaver in 4/4 metre (F I) or to dotted crotchet plus quaver in 4/2 metre (P VI), in this way changing the threefold subdivision of triplets into the fourfold subdivision of semiquavers or quavers respectively. In both cases, the comprehensive value, crotchet or minim respectively, is being decreased from degree 2p to degree 3/2p. This retardation of the comprehensive value results in the constant speed 6p of the subdivision values, due to the change into the fourfold subdivision. By the way, the Gigue of the Partita VI was, previous to the publication, written down one note value smaller in both the Keyboard Books for Anna Magdalena Bach, concordant with the Gigue of the French Suite I.

Especially within Bach's keyboard works, several examples are handed down for the notation of a piece in two adjoining degrees of note values, one of them smaller and the other larger. For my part, a philosophical superstructure should not be insisted upon to explain this fact, at least when discussing tempo. Rather, two pragmatic reasons should be taken into account, a graphic and an economic one. In notating an intricate polyphonic structure, in particular for more than four parts, on the two systems of the keyboard notation, the beams are a substantial obstacle, which can be considerably diminished when choosing a notation one note value degree larger, especially changing consecutive quavers into crotchets. This may be a reason why the five-part fugues in C-sharp minor (BWV 849/2) and B-flat minor (BWV 867/2) of the first volume of the *WTC* are written in 2/2 metre. And in preparing a copper-plate publication, saving beams meant reducing costs.

Four Gigues are notated in 6/8 metre (E I and P V) or in 3/8 metre (E V and F III). Their comprehensive value of a dotted crotchet, however, is not subdivided into three quavers but into six semiquavers. The tempo degree of the comprehensive value of the dotted crotchet is further decreased to p, which results in the degree 3p for the quaver beat including two of the six subdivision units. Again, the speed of the subdivision values remains constant. This also concerns the two Gigues, which belong to the type of the Canarie. They are notated in 3/8 metre (F II) or in 6/8 metre (French Overture), but intensify the triplet subdivision of the three equal quavers by dotting the first note and

correspondingly shortening the second note to a semiquaver, in that way assuming a subdivision into six semiquavers. This constant speed 6p of the subdivision values does not only group the seventeen Gigues together, but also connects them with the main group of the Correntes, exhibiting the same speed of subdivision values. The decisive criterion for both dances is the constant speed of subdivision values, whose varying configurations cause changing tempo degrees of the comprehensive values.

The main group of seventeen Gigues is confronted with two other Gigues which increase the speed of the smallest subdivision values by half, namely from 6p to 9p. Indeed, the main groups of Correntes and Gigues share a corresponding speed of the subdivision values. Concerning the increase of the speed, however, the Gigues surpass the Correntes by a sixth of the original value (the Correntes increasing not by half, but by one third from 6p to 8p only). These two Gigues (F VI and A minor) are notated in 6/8 metre; with regard to the comprehensive value of a dotted crotchet, they should be associated with the degree 2p. However, they introduce semiquavers into the triplet division of the dotted crotchet to a larger extent. Therefore, their degree is being decreased to 3/2 p, what actually leads to the increased speed 9p of the subdivision values. Finally, the Loure (F V) can rhythmically be regarded as a slow complement to the vivacious Canarie. The quarters of the 6/4 metre are related to the degree 3/2p, its dotted minims to the degree 1/2p. Therefore the ratio of the Loure to the Canarie is 1 : 2.

The response that this is not Bach's systematisation of time structure defining his music, but mine, can be anticipated. Although I should be flattered by such an objection, I ungrudgingly acknowledge Bach's authorship of this extraordinary music-theoretical achievement. It is an achievement that needs to be acknowledged as an indispensable feature of his outstanding compositional competence.

Translated by Reiko Füting