

Fugues and Fingering:
Scales and Other Technical Devices in Bach's Contrapuntal Works
David Schulenberg

We do not usually think of Bach as a composer of etudes, that is, keyboard compositions that are meant to exercise the fingers in a particular way. Apart from one short prelude entitled *Applicatio* or “Fingering,” Bach wrote nothing explicitly of this type. But neither did his contemporaries, and the etude in the modern sense emerged only after 1800.

Bach, of course, had published a series of works under the title *Clavierübung* or “Keyboard Practice.” This was evidently equivalent to the “lessons” and *essercizi* published in other countries. But regardless of how genuinely these works reflected the didactic pretences of their titles, they comprise all sorts of music. Rarely do they derive their musical content from any specific sort of finger exercise or technique, as in later studies by Schumann or Chopin. Yet a systematic concern with digital mechanism was indeed manifest in the eighteenth century, not least in works by Bach and his circle. In this paper I would like to demonstrate how, in a few rather special works of Bach, considerations of digital technique are enmeshed with the contrapuntal design of the music. I would also like to point out the special role played in some of Bach's keyboard pieces by one particular figure, the scale, which today is often associated, at least in the popular mind, with manual technique. My purpose is not to make any profound claims about Bach's music or his compositional process, but simply to point out a number of procedures in Bach's music that are not usually associated with it.

The *Versuch über die wahrer Art das Clavier zu spielen*—the “Essay on the True Manner of Playing Keyboard Instruments”—by Bach's son Carl Philipp Emanuel was one of the first keyboard treatises, if not the first, to prescribe fingerings for all major and minor scales. It was published simultaneously with the composer's *Probestücke*, in which all fingerings were marked. These pieces sparked a series of imitations in Germany, among them a relatively elementary work again entitled *Clavierübung*, by Johann Philipp Kirnberger, another pupil of J. S. Bach. Perhaps more tellingly, Emanuel credited his father with having developed modern fingering, at a time when many supposedly still played without use of the thumb (*Versuch über die wahre Art das Clavier zu spielen*, Berlin, 1753–62, i.1.7).

In fact, Sebastian Bach was hardly the first to use modern scale fingering, and a careful reading of Emanuel's text shows that he made no such claim of his father. Emanuel himself continues to give so-called “paired” fingerings, without thumb crossing, as options for scales in a few keys (exx. 1, 2). Such supposedly archaic fingerings remain useful in many contexts in the music of the eighteenth century and later. But it is evident from his Essay that Emanuel was thinking about keyboard technique in a newly systematic way. A part of this thought would have been the invention of practical fingerings for scales in the more remote keys that previously had been rare in keyboard music. Working out reliable fingerings for all keys would have required discovering and applying certain general principles; in an age that valued reason and its application to the arts, this process might have seemed a significant intellectual achievement; hence its ostentatious presentation in C. P. E. Bach's *Versuch*.

Given the use of all twenty-four keys in the keyboard music of J. S. Bach, we must conclude that he too had thought seriously about keyboard technique, even if he never put his thoughts down in writing. J. S. Bach, however, could never have been as systematic in his practice as some of his pupils, for his contrapuntal works regularly require the fingers to move in

Ex. 1. *Applicatio* BWV 994

The image shows two systems of musical notation for a piano exercise. Each system consists of a treble and bass clef staff. The first system contains four measures, and the second system contains four measures. Fingering numbers (1-5) are written below the notes to indicate fingerings for both hands. The piece is in a common time signature and features a mix of eighth and sixteenth notes.

Ex. 2. Scale fingering from C. P. E. Bach, *Versuch i, Tabula I*

The image displays four figures of a scale exercise, labeled Fig. I, II, III, and IV. The title "TAB. I." is written in a decorative script at the top right. Each figure is written on a single staff with a treble clef and includes detailed fingering numbers for every note. The exercise is in a common time signature and consists of a sequence of eighth and sixteenth notes.

Ex. 3. Domenico Scarlatti, *Essercizi*, no. 4

The image shows four systems of musical notation for a piano exercise. Each system consists of a treble and bass clef staff. The first system is marked "Allegro." and "N.º 4." The piece is in a common time signature and features a mix of eighth and sixteenth notes. The exercise is characterized by its rhythmic complexity and the interplay between the two hands.

ways contrary to the patterns appropriate to simple scales. Thumbs must be placed on accidentals, digits repeated for different notes that one might have preferred to slur, and so forth. Had Bach held any rules for fingering in mind while composing, he could never have imagined many of the things that happen in his keyboard music.

Nevertheless, certain pieces suggest that Bach sometimes worked in the opposite direction, developing ideas that arose from considerations of digital technique into musical ones. Peter Williams has noted that some of Bach's Inventions are based on motives that exercise different fingers. Comparable writing occurs in Domenico Scarlatti's sonatas, of which Bach could have known the *Essercizi*, published about 1738 (ex. 3). Rameau's suites might also have provided some inspiration, as Williams has suggested (ex. 4). But these works rarely involve the types of contrapuntal development characteristic of Bach's music. Besides, Bach had composed the Inventions by 1723, possibly before he knew anything by Scarlatti or Rameau.

One later work, the Goldberg Variations, goes significantly farther than the inventions in working out motives that seem to have had their inspiration in keyboard technique. Several of the variations use both motivic and contrapuntal inversion to reflect the physical or mirror relationship between the left and right hands. The most elaborate instances occur in the duet variations 14 and 17. Here the traditional inversion of melodic material after the double bar coincides with the exchange of the same material between the hands. At the start of variation 17, the left hand uses a series of broken thirds to climb through no less than two octaves and a half; the right hand falls through the same interval after the double bar, inverting the idea (ex. 5). Accidentals make it impossible to employ exactly the same fingering for each hand, but at least in principle there is a symmetry here that involves motive, counterpoint, and technique. In variation 14, the symmetry is made even more spectacular by incorporating the special technique of hand crossing (ex. 6). The result is an intricate, highly symmetrical pattern involving both music and the physical movement of the two hands, analogous to the choreography of a formal French dance for a pair of dancers.

A similar principle plays out on a grander scale in several movements of the *Art of Fugue* that involve mirror symmetry. The mirror fugues in this set have an antecedent from some twenty years earlier in the gigue from the Sixth English Suite. The last movement of the last suite in the set, this was clearly meant to be a climactic tour de force. It is in fact Bach's most extended and systematic exercise in mirror counterpoint prior to the *Art of Fugue*. Its subject develops a motive that repeatedly exercises certain fingers, including the thumb (ex. 7). The subject is inverted after the double bar, and the nearly exact mirror relationship between most passages in the respective halves of the piece assures that both hands get equal workouts (ex. 8).

Probably composed even before the inventions, the gigue of the Sixth English Suite suggests that Bach was already thinking about mirror symmetry at both the contrapuntal and the manual or digital levels before he left Weimar in 1717. At the very least, an element of what we might call inspiration from fingering can be supposed to have gone into certain types of contrapuntal but also athletic pieces, such as giges. A somewhat later example is the gigue of the Third Partita, which follows the same general scheme as the earlier gigue, although without a thoroughgoing mirror structure (ex. 9). Somebody, not necessarily Bach, later altered the piece after the double bar so that the subject would invert more literally (ex. 10; in the first full measure after the double bar, d# was changed to f (twice); in the third measure, B and g# were changed to d and b b; and so on). The changes would have allowed the left hand to use the same

Ex. 4. Rameau, *Nouvelles suites*, "Les trois mains"

LES TROIS MAINS.

The image shows two systems of musical notation for 'Les trois mains' by Rameau. Each system consists of two staves. The first system is marked with a treble clef and a common time signature. The second system is marked with a bass clef and a common time signature. The music features complex rhythmic patterns and dynamic markings such as accents and slurs.

Ex. 5. Goldberg Variations BWV 988, var. 17

28. *Variatio 17. a 2 Clav.*

The image displays six systems of musical notation for Variation 17 of the Goldberg Variations by J.S. Bach. Each system consists of two staves. The music is written in a complex, rhythmic style characteristic of the Goldberg Variations, featuring intricate patterns and dynamic markings. The notation includes various clefs, time signatures, and articulation marks.

Ex. 6. Goldberg Variations BWV 988, var. 14

14. Variatio 14. a 2 Clav.

The image shows the musical score for Variation 14 of the Goldberg Variations, BWV 988, for two keyboards. The score is written in G major and 3/4 time. It consists of seven systems, each with a treble and bass staff. The music is highly rhythmic and technical, featuring many sixteenth and thirty-second notes. Fingering numbers (1-5) are indicated throughout the score. The piece is in a 3/4 time signature and G major.

Ex. 7. English Suite no. 6 BWV 811, gigue (first half)

The image shows the musical score for the first half of the Gigue from English Suite No. 6, BWV 811. The piece is in 3/8 time and G major. It consists of four systems of two staves each. The word "Gigue." is written to the left of the first system. The music is characterized by a rhythmic pattern of eighth and sixteenth notes. Fingering numbers (1-5) are indicated throughout the score.

Ex. 8. English Suite no. 6 BWV 811, gigue (second half)

Ex. 9. Partita no. 3 BWV 827, gigue (first half)

Gigue.

Ex. 10. Partita no. 3 BWV 827, gigue (second half)

fingering for the subject that the right hand uses at the beginning of the piece.

Clearly, not every piece involving contrapuntal or motivic inversion was inspired by considerations of keyboard technique. In fact, the illustrations I have shown may be unique in the degree to which the mirror symmetry of the contrapuntal or motivic work is reflected by that involving the hands. But technical considerations of a more general nature would certainly have entered into the compositional thought of a virtuoso such as Bach, most obviously in the use of virtuoso figuration to produce a musical climax in the course of a movement.

One particular type of figure is used in a number of his keyboard pieces in a way that leads me to wonder whether that figure might have had some special significance for Bach, if only because it was a special object of both thought and practice for a keyboard player. That figure is the scale, which is now such a commonplace feature of elementary pedagogy that its use in Bach's music may seem an unpromising subject. Long before Bach's day, scales had become hackneyed formulas in improvisational keyboard pieces such as preludes and toccatas. Yet a newly purposeful use of scales as motives can be discerned in certain early eighteenth-century Italianate pieces. One example is Vivaldi's G-major violin concerto op. 7, no. 8, which Bach arranged for solo keyboard, probably during the teens of the eighteenth century. The ritornello of the last movement is built largely around a descending scale motive. Bach reworks the end of the movement to create a dazzling apotheosis of the simple scale. Here he combines ascending and descending scales simultaneously in a passage that is virtually unplayable on a single manual, although I think that must be what he had in mind (ex. 11).

Even if played on separate manuals, scales criss-crossing in the same register is an idea that in keyboard music is unavoidably bound up with the question of how to play it, and what it looks like to see it played. In short, this is a gesture clearly meant to allow a virtuoso to show off a particular technical trick, which Bach obligingly places at the very end of the arrangement. His original music, of course, is usually more restrained than this example. If there is a single climactic gesture, it is likely to occur around the beginning of the last section, not at the end of it. Often, instead of a discrete climax, one finds instead a general intensification during the final section; Joel Lester has described this sort of intensification as a heightening of activity. The "activity" can include new, livelier counterpoint overlaid upon previously introduced, slower-moving material; scales are a favorite device for this purpose. Sometimes the introduction of a scale seems to serve as a culmination of the piece, in the sense of fulfilling or completing something; the scale does this either by spanning the entire keyboard, or in other cases simply by finishing a process of development that began with shorter scalar motives heard previously in a movement.

Bach seems to have begun using scales in this way by an early point during his Weimar years, perhaps around 1710, when he was apparently concentrating on the composition of keyboard music and probably intensively improving his keyboard technique at the same time. An early instance occurs in the A-minor suite BWV 818, which seems to have been a precursor of the English and French Suites. The concluding gigue uses a very simple subject built from a three-note scalar motive. The slightly stodgy counterpoint gradually grows more animated, as sixteenths are set against the initial eighths (ex. 12a). The process reaches a climax five measures after the double bar, where a scale that begins near the top of Bach's keyboard sweeps down to low C, passing from the soprano to the bass (ex. 12b). Typical keyboard instruments of the time had only a four-octave range, perhaps extended at the top or bottom by a note or two. Hence this passage effectively covers the entire keyboard.

Ex. 11. Concerto BWV 973 after Vivaldi, RV 299, third movement

55

58

61

Ex. 12a. Suite BWV 818, gigue (first half)

Gigue.

55

58

61

Ex. 12b. Suite BWV 818, gigue (second half)

55

58

61

In a number of more mature works, scales emerge not as free counterpoint but as developments of shorter diatonic motives. This can happen in highly restrained or refined ways, in pieces that are far from a dazzlingly virtuoso style. For instance, the first movement of the First French Suite is an allemande that quietly introduces a descending scalar motive shortly before the double bar. Initially comprising seven sixteenth notes, the motive expands to nine when it appears in the bass in the middle of the second half (m. 17). The climax occurs a moment later, where the two hands move linearly in opposite directions to form a tritone on the downbeat of m. 19 (ex. 13). Comparable moments occur in dance movements from other suites.¹

The *Well-Tempered Clavier* contains further instances of scales that emerge as climactic gestures at the end of a developmental process. Two fugues from book 2 illustrate particularly refined instances of this. The episodes of the D-major fugue are based on a five-note descending figure, drawn from the second half of the subject (ex. 14). In the course of the fugue, the motive grows to six notes (m. 7), then to eight (m. 16). The process culminates in a two-octave descending scale in the bass (mm. 38–40) (ex. 15).

A similar process occurs in the fugue in E. The subject, which is famous for opening with a chant motive, closes with a short scalar descent (ex. 16). This too is eventually extended into a complete scale. But here the completion of the idea occurs in the treble, in the penultimate phrase. Here the upper voice forms a long arch that rises to the highest note in the piece (a'', m. 38) before descending through more than an octave. The descent continues in the final phrase, which echoes several chorale melodies whose closing phrases have similar outlines (ex. 17).

A number of other works use scales in a somewhat different way, introducing them to dramatize an important formal juncture near the end of the piece. One early example occurs in BWV 954, a fugue whose subject Bach borrowed from a work by the Hamburg organist Jan Adam Reinken. The climax occurs when the subject returns in the tonic after a lengthy episode; at this point the subject is accompanied by scale figuration descending through three octaves (c''' to B♭: ex. 18). The subject subsequently enters in stretto, each statement accompanied by scales. This marks the beginning of the final section of the piece, which, perhaps fortuitously, therefore has some of the character of a sonata-form return.

Something similar occurs in the first allegro from Corelli's opus 3, a set of twelve sonatas for two violins and continuo. The movement in question is an imitative allegro (ex. 19a). Its final section opens with a descending scale played ostentatiously by the first violin, which then restates the original subject while the second violin imitates the scale (m. 22). The climax occurs just before the end, where the texture expands to four parts to allow the bass string instrument to echo the scale idea (m. 30: ex. 19b). Bach probably knew at least the fourth sonata from Corelli's opus 3, which was originally published in 1689. Bach's organ fugue BWV 579 borrows the two subjects from the second movement of that work.

Whether or not Bach knew the Corelli movement illustrated above, such pieces would have demonstrated to Bach and other German composers the possibility of combining serious counterpoint with the forthright virtuosity and playful motivic work. Older German pieces tended to dissolve into virtuoso improvisations after a fugue had run out of ideas; Bach still does this in BWV 579. But in the new style the virtuoso ideas became integrated into a formal design that

¹ E.g., the Fifth French Suite (courante, m. 28) and the First Partita (minuet 1, mm. 31–2), both probably completed in 1723 or later after Bach's move to Leipzig.

Ex. 13. French Suite no. 1 BWV 812, allemande

Ex. 14. *Well-Tempered Clavier II*, Fugue in D BWV 874, opening

Ex. 15. *Well-Tempered Clavier II*, Fugue in D BWV 874

Ex. 16. *Well-Tempered Clavier II*, Fugue in E BWV 876, opening

Ex. 17. *Well-Tempered Clavier II*, Fugue in E BWV 876

Ex. 18. Fugue on a subject by Reinken BWV 954

Ex. 19. Corelli, Sonata a tre op. 3, no. 1, second movement, opening

Allegro.

Ex. 19. Corelli, Sonata a tre op. 3, no. 1, second movement

20

24

27

30

Viol.

Org.

also encompasses the contrapuntal ones. The grandest instances of this technique occur in Bach's organ fugues, which in some cases combine abstruse contrapuntal technique with the most forthright virtuoso gestures. No other category of Bach's music so clearly combines technical with compositional innovation, for here Bach developed pedal as well as manual technique to a degree unprecedented in written compositions.

For instance, the fugue in G minor BWV 542/2 combines a scale of two and a half octaves with the entry of the subject that opens the final exposition (mm. 93–4: ex. 20). This example may seem unimpressive, since the texture at this point is restricted to two voices and the pedal is silent. But in the fugue in C minor BWV 546/2, the last entry of the subject follows a long episode and therefore functions as a final return. The subject, in the pedals, is accompanied by a descending scalar figure that spans nearly two octaves in the tenor (mm. 140–1: ex. 21). Scales also articulate the end of the last episode in the “Dorian” fugue, BWV 538/2. In this work, which contains one of Bach's most thorough demonstrations of stretto technique, the final episode concludes with scales in contrary motion (mm. 200–201: ex. 22).

Could any of these scales have possessed more than an abstract or purely formal meaning? Bach used the scale as a clear if obvious form of musical representation in Cantata 12, written at Weimar in 1714. There the scale serves as a sort of cantus firmus in the first violin part, in the accompaniment of a recitative (ex. 23). The text suggests a meaning for the scale: “Only through tribulation can we reach the kingdom of God.” Similar connotations attend the famous rising scale at the end of Froberger's lament for the Habsburg crown prince Ferdinand IV. In case there was any doubt, Froberger's autograph manuscript of 1654 includes a visual representation of the imperial apotheosis (ex. 24). There is no documentation that Bach knew this piece, but Froberger's programmatic efforts were well known. Kuhnau and Mattheson referred to them in published writings, and other works by Froberger circulated among Bach's pupils, although none of the pieces in question carry any known programmatic associations.

Such musical symbolism in both the cantata and the Froberger lament now may seem embarrassingly obvious. But at a time when scales were a serious topic of theoretical speculation, more might have been involved here than a vague analogy to heavenward motion. The Latin word *scala* means ladder. The text of the recitative movement is from the book of Acts, but listeners might have recognized in the scale a reference to Jacob's ladder, described in Genesis. Of course, it is pure speculation to imagine that the same association would have occurred even to a pious organist practicing the scale figures in Bach's fugues.

Still, theorizing about scales and gamuts remained a concern in the second decade of the eighteenth century, when Mattheson engaged in a famous if arid controversy on the subject with the organist Johann Heinrich Buttstet. Bach must have been aware of such debates, but it would have been characteristic of him to make his response, if any, in a practical rather than a verbal form. Mattheson and Buttstet had debated the value of the traditional modes and related practices such as hexachordal solmization. Bach, who evidently took for granted what we identify as the major and minor scales, presumably would have been more concerned with how to finger them, especially in the more remote keys explored in his works. Surely he was aware of hexachord fantasias by such older composers as Frescobaldi and Froberger. Bach even was the probable composer of an organ fantasia in G, BWV 571, which ends with a movement constructed over a

Ex. 20. Fugue in G minor BWV 542/2

Handwritten musical score for Ex. 20, Fugue in G minor BWV 542/2. The score is divided into two systems. The first system is labeled '91' and the second system is labeled '94'. Each system contains three staves: a treble clef staff, a grand staff (treble and bass clefs), and a bass clef staff. The music is in G minor and 3/4 time. The first system shows a complex texture with rapid sixteenth-note passages in the treble and bass clef staves, and a more rhythmic accompaniment in the grand staff. The second system continues this texture with similar rhythmic patterns and melodic lines.

Ex. 21. Fugue in C minor BWV 546/2

Handwritten musical score for Ex. 21, Fugue in C minor BWV 546/2. The score consists of three staves: a treble clef staff, a grand staff (treble and bass clefs), and a bass clef staff. The music is in C minor and 3/4 time. The treble clef staff features a melodic line with frequent sixteenth-note runs. The grand staff provides harmonic support with chords and moving lines. The bass clef staff has a steady, rhythmic accompaniment.

Ex. 22. Fugue in D minor BWV 538/2

Handwritten musical score for Ex. 22, Fugue in D minor BWV 538/2. The score is divided into two systems. Each system contains three staves: a treble clef staff, a grand staff (treble and bass clefs), and a bass clef staff. The music is in D minor and 3/4 time. The first system shows a complex texture with rapid sixteenth-note passages in the treble and bass clef staves, and a more rhythmic accompaniment in the grand staff. The second system continues this texture with similar rhythmic patterns and melodic lines.

Ex. 23. *Weinen, Klagen, Sorgen, Zagen* BWV 12, third movement

RECITATIVO.

Violino I.

Violino II.

Viola I.

Viola II.

Alto.

Continuo e Fagotto.

Wir müssen durch viel Trüb.sal, durch viel Trüb.sal, wir müssen durch viel

Trüb - sal, durch viel Trüb - - - sal in das Reich Got - tes ein - ge - - - hen.

Ex. 24. Froberger, Suite XII, Lamento, conclusion, from A Wn 18706

The image shows a single melodic line of music with complex rhythmic patterns, including sixteenth and thirty-second notes, and a decorative flourish at the end.

hexachordal ostinato (ex. 25). The hexachord is extended to a full scale in its last statement (ex. 26).²

I would not claim that this symbolizes the victory of Mattheson's modern tonal thinking over Buttstet's modes. It is, however, another manifestation of the process I previously described in movements from the *Well-Tempered Clavier*, where a relatively brief motivic idea finds a sort of completion in its expansion to a complete scale. The idea of a scale as some sort of totality, the fulfillment of a previously heard implication, can also be seen in those cases of scale figuration that cover the entire keyboard tessitura. Scales had been a conventional part of keyboard playing since at least the sixteenth century. But scalar figuration that covered virtually the entire keyboard would have remained a significant gesture.

Notwithstanding the possible theological allusion mentioned earlier, I would like to close by pointing to a very different, secular image that more assuredly was associated with virtuoso keyboard figuration. In his biography of Bach, published in 1802, Johann Nicolaus Forkel quotes a colorful phrase which Bach supposedly used to disparage composers who, in Forkel's words, "let their fingers first play for them what they are to write, instead of writing for the fingers what they should play."³ Bach supposedly called such players "clavier hussars," using a term that refers to lightly armed mounted troops. Hussars, who often wore extravagant, florid uniforms, were especially associated with Poland and with Hungarian cavalry units in the imperial army. Hence there might have been an ethnic slur implicit in Forkel's use of the phrase; for Forkel writes as a German nationalist, elsewhere praising Bach for his contributions to a specifically German type of music. Bach's use of the term, if it was his, could have reflected similar prejudices. Nevertheless, his own music is not exactly free of passagework that runs up and down the keyboard. If he ever did speak of keyboard playing in terms of a cavalry charge, it would have reflected the realization, shared with later musicians, that a virtuoso piece could indeed serve as a war horse. Contrary to Forkel, whose aim here is to depict his subject as someone above crass considerations of mere virtuosity, the latter cannot be disentangled from allegedly more substantive qualities even, or especially, in the music of Bach.

² Not a true hexachord since the notes are those respectively of descending scales in G major and E minor, not the hexachord of traditional solfeggiation. Peter Williams, *The Organ Music of J. S. Bach*, 2d edn. (Cambridge: Cambridge University Press, 2003), 166, is among those not convinced of Bach's authorship, due to its "uneven composition," though its sources are good and the "unevenness" is shared with the chorales in the so-called Neumeister Codex; the second movement ends with a type of dissonant cadence that seems to be an early Bach fingerprint (Williams, 576).

³ *Ueber Johann Sebastian Bachs Leben, Kunst und Kunstwerke* (Leipzig, 1802; facs., Frankfurt: Grahl, 1950), 23; translation in Hans David and Arthur Mendel, *The New Bach Reader*, ed. Christoph Wolff (New York: Norton, 1998), 441.

Ex. 25. Fantasia in G BWV 571, third movement, opening

Allegro.

The musical score for Ex. 25 is presented in two systems. Each system contains three staves: a right-hand staff, a left-hand staff, and a bass line staff. The key signature is one sharp (F#) and the time signature is 3/4. The tempo marking is *Allegro.* The right-hand part features a rhythmic pattern of eighth and sixteenth notes, while the left hand and bass line provide a steady accompaniment.

Ex. 26. Fantasia in G BWV 571, third movement

The musical score for Ex. 26 is presented in four systems. Each system contains three staves: a right-hand staff, a left-hand staff, and a bass line staff. The key signature is one sharp (F#) and the time signature is 3/4. The right-hand part features a complex rhythmic pattern of eighth and sixteenth notes, while the left hand and bass line provide a steady accompaniment.