

Fugue No. 15

G Major

Well-Tempered Clavier Book I

Johann Sebastian Bach

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Subject: Fugue No. 15, *Well-Tempered Clavier*, Book I

In this analysis we'll consider how the fugue is like a building: a classic villa by the Venetian architect Andrea Palladio. Carl Gable has theorized that Palladio's designs have endured for three reasons. We see these traits too in the blueprint of a fugue.

- dramatic exterior motifs
- economical materials
- internal harmony and balance

I shall conclude with a reflection on the Pythagorean ideal of beauty as related to goodness and divine order.

Dramatic Exterior Motifs

The notion of fugue as architecture is neither radical nor new. Goethe described it as "a really beautiful idea [that] could not be better reintroduced than by calling architecture *silent* music." Hegel wrote that, "Music is architecture translated or transposed from space into time; for in music, besides the deepest feeling, there reigns also a rigorous mathematical intelligence."

It is a likely conjecture that Palladio and Bach would have agreed with this analogy. Their work represents the culmination of respective art forms and

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epochs, Renaissance and Baroque. Both periods were known for lavish ornamentation. Palladio's magnificent interior spaces were decorated with accoutrements befitting proud and wealthy patrons. His exterior style is distinguished by symmetrical motifs: classical columns crowned by architrave, frieze, and pediment.

Palladio's popularity among Venetian aristocrats grew as he dared to place mortals in residences that had, in classical Greece, been occupied by gods. The popularity of this style continues today in the U. S. Capitol, southern plantation homes and modest facades of ranch houses sprinkled through every subdivision of our country.

Bach's music too synthesizes the human and divine. His approach was to bring the ornately mannered style of the court and opera into the church. Three-fourths of his music was composed for the Lutheran liturgy, a fact often overlooked by today's secularized audiences. Bach was born one hundred years after Palladio had died. During Bach's career the Palladian symmetrical style had become fashionable among French aristocrats who quickly assimilated the proportions of that style into their music.

The subject of this fugue demonstrates the confident left-to-right balance of a Palladian villa. Its beginning and end are rhythmically identical. As if in dialogue, one asks a question that the other answers. These are like the *barchessas* that flank the *loggia* (main living quarters) in Palladio's famous elevations.

Observe that Bach's rhythm follows an eighth note with four sixteenths. By contrast the subject's middle section retrogrades and doubles the rhythm of its flanks to four eighth notes followed by a quarter. The subject's 1st duration is in proportion to its 2nd as the 3rd is to its 1st ($a:b = b:c$).

This proportion is the *geometric mean*. Palladio used it in his designs as well. Here for example are his instructions for the construction of a room by the geometric mean:

The length and breadth of the room being known, we will find a number that has the same proportion to the breadth as the length has to the number sought. If the place we intend to vault is nine feet long and four feet wide, the height will be six feet.

Four Books of Architecture, 1570.

If the subject's middle section retrogrades the rhythm of its flanks, it is also distinguished by a similar melodic transformation. Observe how the subject's beginning and end are comprised primarily of steps (intervals of the 2nd). By contrast, the middle section contains two giant leaps of a 7th, the inversion of a 2nd. These dramatic leaps are found in m. 2 and m. 3. In terms of exterior motifs, they stand out like the columns of a Palladian portico.

Economical Materials

Palladio began his career as a stonemason's apprentice. His expertise as an architect evolved from his intimate knowledge of the materials used in construction. He supplemented this by studying the re-discovered writings of the

Roman Vitruvius, whose work had been based upon proportions found in Greek temples.

One aspect of Palladio's genius is that he used ordinary materials to reduce the cost of his structures. His exteriors look as if they were made of stone, but they are actually composed of brick, stucco, and terra cotta. Instead of lining interior walls with expensive tapestries, Palladio hired artists to decorate his rooms with frescos. He used simple materials to create the complex.

Bach too had an intimate knowledge of the materials used in construction. He began his education in the musical "quarry," mining the building blocks of composition by hand-copying the music of Renaissance masters.

One of the elemental materials comprising the basis for technique on every musical instrument in every style is the scale. This fugue is all about scales, in their descending and ascending forms. Notice that Bach has ornamented them by returning to the same pitch after every scale step. This gives the scalar passages an angled profile like that formed by the slope of the villa's pediment and the horizontal architrave to which it is connected.

I have identified these angled passages with arrows each time they occur. Amazingly they are heard in all but two measures where the subject is not in process. You might think of it as connective "stuff," like the mortar to which the fugue's main architectural object, its subject, has been attached.

Internal Harmony and Balance

What sets Palladio apart from even his most ardent imitators is his fastidious application of proportions that he perceived to be harmonious and balanced. I have mentioned the *geometric mean* as foundational to his designs. The most famous geometric proportion is that of the *golden mean*. This is the ubiquitous ratio .618 to .382 that the Greeks discovered in nature. Palladio has imitated this mean many times in the above elevation. It exists for example in the horizontal proportion between the *loggia* and its flanking *barchessas*. The villa maintains the mean in its vertical ratios as well.

Bach's fugue is also proportioned by the golden mean. It has two expositions. The first presents the subject right side up. This is followed by a counterexposition in which the subject is heard upside-down. The measures devoted to these expositions are .383 of the fugue. The following development comprises .617. The measures devoted to exposition are likewise proportioned according to the golden mean.

Palladio did not use just the *geometric mean*. The *harmonic mean* was another, and without doubt the most esoteric, Palladian proportion. It was based upon the division of a vibrating string (monochord) into six aliquot parts. The frequencies produced by each division are of *different* proportions. By study of the monochord, Palladio's contemporary, Zarlino, found that he could generate all of the consonant intervals. His work laid the foundation for music theory until Rameau and Bach.

In 1949 Rudolph Wittkower proposed that Palladio too had used the harmonic

mean (*Architectural Principles in the Age of Humanism*).² The object was to produce living spaces that were *musically* consonant with themselves and each other. It is upon this basis that Nikolaus Harnoncourt described Palladio as having created a kind of "petrified music."

The proposition that what pleases the ear will also please the eye was not unique to Palladio. He learned it from Plato by way of St. Aquinas, St. Augustine, and Plotinus. One of the most articulate statements in this regard was made by Leone Battista Alberti (1404-1472) whose main contribution was to develop perspective in painting. Alberti was convinced of the Pythagorean truth that, "Nature is sure to act consistently," He concluded that "the same numbers by means of which the agreement of sounds affect our ears with delight are the very same which please our eyes and our minds."

It is here that Palladio intersects most clearly with the music of J. S. Bach. The Wohltemperirt system of tuning, which the *Well-Tempered Clavier* was written to champion, was fundamentally about resolving intonation problems created by various harmonic means when applied to the tuning of keyboard instruments.

Pythagorean Ideal of Beauty

Gable has demonstrated how Palladio's architecture has endured because of dramatic exterior motifs, economical materials, and internal harmony. That these qualities apply equally to a Bach fugue is evidence of something larger at work. Both artists were devoted to the proposition that beauty in anything is related to its goodness. They believed further that there are objective criteria for goodness, one of the most important of which is to reflect a divine order.

The origin of this mode of thinking traces to Pythagoras who posited that there was, "a geometry in the humming of the strings, music in the spacing of the spheres." He believed that each planet produced a different pitch at the frequency of its orbit, and that these frequencies were in proportion to the harmonic mean. He called these consonances the *Musica Mundana* (normally translated "music of the spheres").

Pythagorians believed that the music of the spheres was so perfect that humans could hear it only in the most unusual of circumstances. Philo of Alexandria taught that Moses heard it on Sinai. St. Augustine believed that men hear it shortly before they die. The music of the spheres was always and everywhere present, governing every temporal and biological cycle.

This conception of the universe persisted from the ancients until the Enlightenment. Two thousand years after Pythagoras we still read in Johannes Kepler of, "the magnificent edifice of the harmonic system of the musical scale, as God, the Creator Himself, has expressed it in harmonizing the heavenly motions" (*Harmonice Munde*, 1619). During the Renaissance and Baroque periods music and mathematics were conceived to be windows through which the laws of *Musica Mundana* might be glimpsed.

² In *Learning from Palladio* (Norton, 2004), Branko Mitrovich objects that Wittkower based this theory upon highly selective examples. In an earlier article, Deborah Howard had also argued that Palladio's proportions were not generally characterized by the harmonic mean.

That Palladio and Bach were intellectually committed to the notion that there was a "music of the spheres" is beyond doubt. It is this belief that unites their work; the parts of a thing are related to its whole, and beauty "happens" only when this interdependence is established. This conception of beauty allowed them to perceive relationships between a fugue's subject and the tuning system by which it was played. It was a small step from there to the proportions of the room in which it was played, the resonant frequency of planet Earth, the harmony of the soul that played it, and ultimately the Creator. These relationships connected the physical world of Bach and Palladio to the metaphysical reality of the spirit that could only be in harmony with the Creator if it was in consonance with the created order.