

And just as Ben Jonson's Volpone, or "the Fox", is ~~appropriately outfoxed~~ at last, so Johnson's ^{q30} ~~virtually~~ counts ^{or not} the end of Volpone ^{lines on} avarice ¹⁹⁷⁷ these lines ^{certainly} evidence of the essential originality of Johnson's poem.

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JOHNSON AND THE PYTHAGOREAN SCALE OF NUMBERS

IN the opening paragraphs of the preface to his edition of Shakespeare (1765), Johnson distinguished between two sorts of knowledge, the first being absolute and demonstrable, such as scientific knowledge, and the second, relative and empirical, such as literary knowledge. The theme, though not original with him, is common in his writings. But unfortunately he illustrated his point by only one specific example, whose meaning is not clear. "The Pythagorean scale of numbers", he wrote, "was at once discovered to be perfect." His editors have not been helpful here. In his Rinehart edition of selected works by Johnson, Professor Bertrand Bronson referred his readers in a footnote to Aristotle's *Metaphysics* I, v, and in the Yale edition Professor Arthur Sherbo merely repeated the same note. I have not found any other editions giving even that amount of help.

The section in the *Metaphysics* referred to by Professor Bronson is certainly about Pythagoras, but I am at a loss to see its relevance to Johnson's observation. I do not read Greek, but there is nothing in either of the English translations that I have consulted that might have suggested the phrase "Pythagorean scale of numbers". It is true that Aristotle wrote that the Pythagoreans did arrange numbers in parallel columns and assign qualities to them, viz.:

... limited and unlimited, odd and even, one and plurality, right and left, male and female, rest and movement, straight and curved, light and darkness, good and evil, square and oblong.¹

I suppose that that might be called a "scale

¹ Aristotle's *Metaphysics*, trans. Richard Hope (New York: Columbia University Press, 1952), 16.

of numbers", but Aristotle did not so describe it and I cannot imagine Johnson's saying of such mystical lore that it "was at once discovered to be perfect". He would more likely have reacted as he did to Berkeley's idealism. Surely what he had in mind must have been some proposition that, unlike the one just quoted, might be immediately assented to.²

Perhaps we should look for Johnson's source in Pythagoras's contributions to musical theory rather than in his numerology. These had long been known to philosophers, and a section was devoted to them in Thomas Stanley's *History of Philosophy* (1665), which had gone into a fourth edition in 1743. According to that writer Pythagoras was the founder of the science of music because he "adapted reasons to the differences of sounds", drawing a sharp distinction, not unlike Johnson's, between a *musician*, who "begin[s] from sense" (or, as we might say, relies on his ear), and a *canonick*, "who is conversant by ratiocination about that which consists of Harmony".³ Though, so far as I can discover, Stanley did not use the word *scale*, in effect he attributed to Pythagoras the establishment of the diatonic and other musical scales: "Thus he [Pythagoras] found the progress by a natural necessity, from the lowest to the highest, according to the Diatonical kind; from which again he did declare the Chromatick and Enarmonick kinds."⁴ By a "progress . . . from the lowest to the highest" Stanley obviously meant what we should now call a scale. Moreover, Pythagoras based his scale on a system of simple mathematical ratios: the interval of an octave, for example, represents a ratio of 1/2, and that of a fifth, one of 2/3. Consequently the pitch of any note may be determined by methods as simple and certain as those used by Euclid to prove one of his theorems.

When the musical histories written by Charles Burney and John Hawkins were published in 1776, some years after John-

son's preface, both were found to contain sections on ancient music and in their sections on Pythagoras to have elaborated on what Stanley had written. Burney attributed to Pythagoras two great achievements: the philosophy of sound and the invention of the eight-note scale. The Pythagoreans, according to him, believed that "intervals . . . were consonant or dissonant in proportion as the ratios of the vibrations were simple or complex. . . . They left nothing to the uncertain judgment of the ear, which they thought no more able to determine a perfect consonance without a Monochord, than the eye to form a perfect circle without compasses."⁵ Hawkins was even more explicit and even more favourable to Pythagoras. Quoting extensively from Stanley, he remarked in a footnote that "the result of this discovery is, that consonancy is founded on geometrical principles, the contemplation whereof, and the making them the test of beauty and harmony, is a pleasure separate and distinct from that which we receive by the senses".⁶ He went on to declare that the principles of Pythagoras were further developed by Archimedes and even printed a diagram that he said was used by Archimedes to prove "that the proportion of the octave is as the whole superficies of a right cylinder described about a sphere, is to the whole superficies of an equilateral cylinder inscribed, that is to say, as 2 to 1".⁷ Finally he printed in diagrammatic form what he called the "System of Pythagoras", which was in fact a scale of two octaves in which the relationships of all the notes were clearly shown.⁸ Although Hawkins did not use the word *scale* in his text, preferring *system*, he referred to this diagram in his index as "scala maxima" and entered it s.v. "scale".

Johnson was no musician and was less at home with its terminology than with that of most of the other arts and crafts. His phrase, "Pythagorean scale of numbers" is odd if not misleading, though "Pythagorean scale" would have been understood and, as we have just seen, that scale was

² Plato also discussed Pythagorean numerology in the *Republic*, 546 a-c, but that locus is open to the same objection as Aristotle's as a source for Johnson.

³ Edn. 1687, p. 530.

⁴ P. 532. John Hawkins quoted a slightly different version of this sentence from the edition of 1701 in his *General History of the Science and Practice of Music* (1776), i, 26.

⁵ *A General History of Music from the Earliest Ages to the Present Period*, by Charles Burney (1776), i, 453.

⁶ i, 26.

⁷ i, 26-7.

⁸ i, 44.

based on numbers. It could also be "discovered to be perfect"—to repeat Johnson's words—by a simple exercise of ratiocination. Johnson might have got the information he used from Thomas Stanley's *History*; of which there was a copy of the 1743 edition in his library (but there is no evidence that he had read it). However, when he wrote the preface he was on intimate terms with both Burney and Hawkins, the two most distinguished English musicologists of his age, and he may very well have learned from either or both of them enough about Pythagoras to supply him with the illustration that came to his mind while writing about Shakespeare.

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