

# PYTHAGOREANS AND SCULPTORS: THE CANON OF POLYKLEITOS

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**B**alance, measure, and law were important principles in ancient Greek art, poetry, drama, and philosophy. For example, proportion was stressed in music and philosophy by Pythagoras, in sculpture by Polykleitos, and in architecture as noted later by Vitruvius. An intriguing question for the student of mysticism is the nature of the interconnections between Pythagoreanism and Western Civilization's ideals of beauty exemplified by the statues of Polykleitos.

The *Canon of Polykleitos*, hereafter referred to as the Canon, was a treatise on creating and proportioning sculpture. It is one of the most important Western artistic and sculptural canons.<sup>1</sup> The author and sculptor Polykleitos was active during the High Classical period in ancient Greece. He had a workshop with apprentices at the shrines for the gods Zeus and Hera at Olympia. He is one of the renowned sculptors of the Classical period, along with Myron and Phidias.

The text of the Canon had a corresponding exemplary statue also called the "Canon," which has been identified as the *Doryphoros* or *Spear-bearer* (c. 450-440 BCE). The *Doryphoros* would have been cast in bronze from a clay model using the lost-wax technique. The treatise and original sculpture have not survived, but testimonia (i.e., quotes, paraphrases and comments)<sup>2</sup> on the Canon are extant from antiquity, as well as Roman marble copies of the original statue [Figure 1, page 24]. The sculpture of Polykleitos, in application of the Canon, represents a high ideal of the human in the dual aspects of our physical and divine natures.

## The Long Tradition of Canons in Art

A canon in art can include both stipulations for subject matter and meaning, including clothing and accoutrements, and some system of proportions for the bodily parts in relationship to the whole. The system of proportions can be specific to types of humans, animals, and deities. Canonical traditions have a long history in various cultures, including canons—some still practiced—for Hindu, Buddhist, and Christian art and icons. The Roman architect Vitruvius gave a description of human bodily proportions based on the canonic tradition in art. During the Renaissance, Leonardo da Vinci and Albrecht Dürer intensively studied and extended the canonic description of Vitruvius. Notably, Leonardo's powerful drawing of the proportions of the human body [Figure 2, page 25] is largely based on the description of Vitruvius, which in turn harkens back to the Canon of Polykleitos.

The use of canons was well established in ancient Egypt. There were two canonical systems, very similar to each other, for wall paintings, relief sculpture, and full three-dimensional sculpture of gods, humans, and animals. These canons were based on a square grid system and standard measurement units derived from the human body (e.g., the "palm," the width of the palm, and the "cubit," the length of the forearm and outstretched hand). The canons for the standing human figure involved square grids, 18, and later 22, units high. The earlier canon dates from the Third to the Twenty-sixth Dynasty, and the later canon from the Twenty-sixth Dynasty (c. 665-525 BCE). Canons for painting

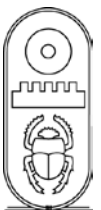




Figure 1: *Doryphoros, Spear-bearer*, 150-120 BCE. Marble. Roman copy of bronze Greek original after Polykleitos. Photo by Dan Dennehy © 2007 [Minneapolis Institute of Arts](#).

and sculpture were part of the Egyptians' highly organized socio-religious systems. The application of the Egyptian canons conveyed stability, timelessness, and a sense of eternal life.<sup>3</sup>

The early Greek sculptors of the sixth century BCE learned some of their methods from the Egyptians. Part of this tutelage must have included the latter's canon because of its central place in the sculptural process. After the Egyptian canons, the next important and detailed description of a canon in the Western world is in the Roman Vitruvius's *De Architectura*<sup>4</sup> (c. 23 BCE), who was trying to follow exemplary practices of the Greeks. The common characteristics and corresponding proportions of the late Egyptian canon and the "Vitruvian canon" were likely directly or indirectly present in the Canon.<sup>5</sup> Indeed, in more mathematical terms, the Canon appears strikingly as an interpolation between the artistic canon of the Egyptian Twenty-sixth Dynasty and the canon of Vitruvius.<sup>6</sup>

### A Reconstructed Outline of the Canon of Polykleitos

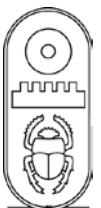
From the quotations, paraphrases, and comments on the Canon extant from antiquity, an outline of the Canon treatise can be reasonably inferred as follows:

- 1) Perfection comes about little by little through many numbers (Philo of Byzantium, *Belopoeica* 4.1).
- 2) The numbers must all come to a congruence through some system of commensurability and harmony, for ugliness is immediately ready to come into being if only one chance element is omitted or inserted out of place (Plutarch, *Moralia* 45C).
- 3) Perfection is the exact Mean in each particular case—human, horse, ox, lion, and so on (Galen, *de Temperamentis* 1.9; *Ars medica* 14; *de Optima nostri corporis constitutione* 4).



Figure 2: Leonardo da Vinci, *Vitruvian Man*, 1485-90, Venice, Galleria dell' Accademia. Photo by Luc Viatour.

- 4) So the perfect human body should be neither too tall nor too short, nor too stout or too thin, but exactly well proportioned (Galen, *Ars medica*; Lucian, *de Saltatione* 75).
- 5) Such perfection in proportion comes about via an exact commensurability of all the body's parts to one another: of finger to finger and of these to the hand and wrist, of these to the forearm, of the forearm to the upper arm; of the equivalent parts of the leg; and of everything to everything else (Galen, *de Temperamentis* 1.9; *Ars medica* 14; *de Placitis Hippocratis et Platonis*; *de Usu partium* 17.1; *de Optima nostri corporis constitutione* 4).
- 6) This perfection requires scrupulous attention to replicating the body's anatomy; not a single error can be tolerated (Galen, *de Usu partium* 17.1).
- 7) In bronze work, such precision is most difficult when the clay is on/at the nail (Plutarch, *Moralia* 86A and 636B-C; cf. Galen, *de Usu partium* 17.1).
- 8) (Exposition of the numbers and their commensurabilities for the perfect human body.)



## 9) (Conclusion.)<sup>7</sup>

We see throughout this reconstructed outline the central emphases on number, proportion, commensurability, exactitude, and beauty. All these features are closely akin to Pythagorean philosophy.

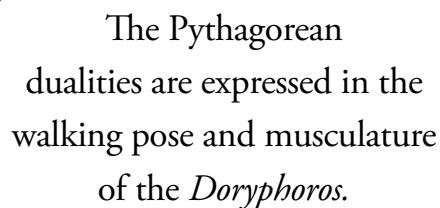
### Pythagoreans and Plato

The philosophy and work of Pythagoras of Samos (c. 570 - c. 490 BCE) and the Pythagoreans is important to investigating the Canon. The Polykleitan testimonia with their emphasis on number, harmony, and beauty appear to be applying, or closely related to, Pythagorean wordings and conceptions.<sup>8</sup> Vitruvius emphasized the importance of the Decad, central to Pythagorean philosophy, in his canonic description of the harmonious proportions of the human body as exemplary for architecture. Also, Aristotle described the ten Pythagorean polarities/dualities, arising from the underlying unity. Unity is, of course, symbolized by 1. Duality is symbolized by 2 and expressed as 1:1. The Pythagorean dualities are expressed in the walking pose and musculature of the *Doryphoros* (e.g., limit/unlimited, odd/even, one/plurality, right/left, nonmoving/moving, straight/bent, square/oblong).<sup>9</sup>

As a continuator of the essentials of Pythagorean philosophy, Plato (427-347 BCE), with his strong interest in beauty and mathematics, held Polykleitos in high esteem.<sup>10</sup> An insightful statement regarding the matter of a proportional canon is Plato's declaration in *Philebus* that "If one were to remove from any of the arts the elements of arithmetic, proportion, and weight, what would remain of each would be negligible indeed."<sup>11</sup> Also in that book, Plato writes at some length on proportion and measure.<sup>12</sup> For example, "Measure and proportion are everywhere identified with beauty and virtue."<sup>13</sup> Also, "Beauty, proportion, and truth...considered as one" gives rise to the good.<sup>14</sup> Plato mentions painters, who

contemplate transcendent truth first, and then "establish in this world...the laws of the beautiful, the just, and the good."<sup>15</sup> This statement would apply to sculptors as well.

For Plato, the transcendent truth would involve divine archetypes, including essential elements of mathematics, and the laws would also involve mathematics as seen from his quotations above. Overall, these statements show the moral and philosophical importance that the mathematical nature of the Canon would have conveyed to Plato, less than a century after the Canon was written.



The Pythagorean dualities are expressed in the walking pose and musculature of the *Doryphoros*.

The literary testimonia on the Canon and the Roman sculptural copies indicate a combined application of contemporary Hippocratic surgical texts and close empirical observation of the human body.<sup>16</sup> The Canon applied two distinct models of proportion, consistent with Pythagorean philosophy, for its composition and the lengths of body parts: 1) 1:1 balancing of opposites from the *isonomia* theory of health, and 2) the ratios of commensurate but unequal lengths of musical harmony.<sup>17</sup>

Some insight into the proportional relationships in the Canon is provided by a testimonia by Galen referencing the texts of Chryssippos of Soli (c. 280 - c. 207 BCE), and ultimately Polykleitos:

*For Chryssippos showed this clearly in the statement from him quoted just above, in which he says that the health of the body is identical with*

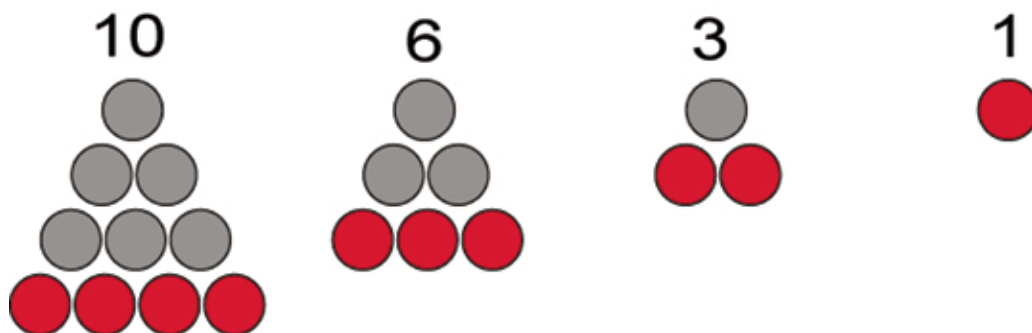


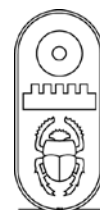
Figure 3: Triangle Numbers. © 2008 Yoni Toker/Wikimedia Commons.

*due proportion in the hot, the cold, the dry, and the moist (for these are clearly the elements of bodies), but beauty, he thinks, does not reside in the proper proportion of the elements but in the proper proportion of the parts, such as for example that of finger to finger and all these to the palm and base of hand, of those to the forearm, of the forearm to the upper arm and of everything to everything else, just as described in the Canon of Polykleitos. For having taught us in that work all the proportions of the body, Polykleitos supported his treatise with a work of art, making a statue according to the tenets of the treatise and calling it, like the treatise itself, the Canon. So then, all philosophers and doctors accept that beauty resides in the due proportion of the parts of the body.*<sup>18</sup>

This description provides a clearer picture of the Canon by describing it as a set of proportions of successive body parts. If a, b, c, ... represent the lengths of the successive parts of the body described in the quotation, then the corresponding proportions in the Canon are: "a:b, b:c..."<sup>19</sup> In Vitruvius's description of a canon, the lengths and heights of body parts are given as fractions of the total height and face height, rather than proportions of successive parts of the body. However, both mathematical expressions have an underlying equivalency.

For example, for Vitruvius, the head height is one-eighth of the total height, and the forearm length is one-quarter,<sup>20</sup> which form a ratio of 1:2:8 for the ratio of the head height to the forearm length to the total body height. Also, beauty residing in due proportion of the parts and whole of the body is in accord with the quotations from Plato given earlier and Vitruvius's description of a canon.<sup>21</sup>

As noted earlier, the Polykleitan testimonia appear to be applying, or closely related to, Pythagorean wordings and conceptions.<sup>22</sup> The figurate numbers were one of the important features of Pythagorean mathematics. The figurate numbers, as implied by their name, formed various shapes such as triangles, squares, and oblong rectangles [Figure 3]. These shapes and their figurate or "gnomonic" numbers may have helped form the shapes dictated by the Canon. A conceptual link between the "gnomonic" numbers and the crafts is the *gnomon*, the set square used by artisans. They were in an L and cross shape.<sup>23</sup> Also, in the figurate number for the Decad, ten, we note the musical ratios of the octave (1:2), fifth (2:3) and fourth (3:4) formed by the successively paired rows.<sup>24</sup> These musical ratios were investigated by Pythagoras on the monochord, also known in Greek as the *canon*. Thus, the Pythagorean theory of figurate numbers and the associated ratios from their construction may have provided a





suitable and attractive theory for Polykleitos to apply in his Canon.<sup>25</sup>

In the history of Western culture, the Canon of Polykleitos became an exemplar for accuracy and the harmonious relations of the constituent parts to the whole in wide-ranging endeavors in art, medicine, science, and engineering.

### The Perfect Ten and the Supermodel

In our own time period, we are surrounded by the heritage and vestiges of the Canon of Polykleitos and its numerical order, akin to the Pythagorean philosophy, that involve the sizing and proportioning of the human body and face: life drawing, ergonomics, reconstructive and cosmetic surgery and dentistry, clothing and fashion to name a few. We observe the great popularity and adulation of youthful and attractive fashion models, movie stars, and athletes. This fascination arises from a long biological, social, and cultural history of humanity [Figure 4].<sup>26</sup>

Additionally, for the mystic, the perfection sought and created in the world is a remembrance and projection of divine archetypes. You may have noticed, for example, that it is harder to estimate the age of a person who is extremely attractive. To the Platonist, the reason is that that person's outer form is relatively close to matching the divine and timeless archetype. Back of the supermodel is the super model, the Canon of Polykleitos. Behind the "Perfect Ten" is the perfect ten, the Decad of the Pythagorean philosophy and the Vitruvian canon. We see in the fads and pursuits of popular culture the outer husk of the inner kernel that is truly longed for: the wisdom bespoken of by the Pythagoreans and the Canon.

### Remembering Who We Are

While the sculptures of the *Doryphoros* and others like it are renowned in the history of art, at best they direct us beyond



Figure 4: Halle Berry, 2004. Photo © 2004 by Alexander Horn/Wikimedia Commons.

history, which is a construction based on the necessary illusion of time. The inspiration behind these statues, closely akin to the Pythagorean philosophy, out of which these works manifested, is directly available to us in the intuitive and meditative experience of the eternal now and eternity. As great as the beauty of these works is, they at best point us to the much greater beauty and perfection that has always been within us, and to which our outer nature will be greatly ennobled by recognizing and heeding throughout life. The Canon and these works of art can help convey to us the inherent nobility of the God within us and our capacity to be a co-creator with God, in the image of God, directing assertively and harmoniously our affairs and environment.

### ENDNOTES

<sup>1</sup> E. Panofsky, "The History of the Theory of Human Proportions as Reflection of the History of Styles" in *Meaning in the Visual Arts*, Anchor Book edition, (Garden City, NY: Doubleday, 1955), 55-107, Fig. 17-27, provides a broad-ranging description and analysis of artistic canons in use in ancient Egypt, Greece, and later. While some of Panofsky's interpretations are not convincing, he still provides a helpful overview of Western canons.

<sup>2</sup> Some of the main testimonia in Greek with English translations are given by Andrew Stewart, “The Canon of Polykleitos: A Question of Evidence,” *The Journal of Hellenic Studies* XCVIII (1978), 124-126. A subsequent clarification of a statement by Philo Mechanicus pertaining to Polykleitos by using two previously unnoticed statements of Diogenes Laertius on the lives of Socrates and Zeno is given by Stewart, “Nuggets: Mining the Texts Again,” *American Journal of Archaeology* 102.2 (1998), 273-275. Additionally, 26 relevant testimonia quotations in Greek with English translations are provided by Gregory Vincent Leftwich, *Ancient Conceptions of the Body and the Canon of Polykleitos*, doctoral dissertation (Princeton University, 1987), 80-96. Some of the Greek terminology that is important to understanding the Canon has been challenging for scholars to interpret and translate into English as noted by Stewart, 1978, especially p.126, and Stewart, 1998, pp. 273-275. In result, some care needs to be taken in using some of the testimonia involved.

<sup>3</sup> Some helpful texts on the canons in ancient Egyptian art include: W. Davis, *The Canonical Tradition in Ancient Egyptian Art* (Cambridge: Cambridge University Press, 1989), especially 11-12, 20-27; E. Iversen, “The Canonical Tradition” in *The Legacy of Egypt*, ed. J. R. Harris, 2nd ed. (Oxford: Oxford University Press, 1971), 55-82, Plates 3-4, especially 56-71; E. Iversen and Y. Shibata, *Canon and Proportions in Egyptian Art*, 2nd ed. (Warminster: Aris and Phillips, 1975); Panofsky, *History of Theory of Human Proportions*, 57-62, Fig.18.

<sup>4</sup> Vitruvius. *Vitruvius: Ten Books of Architecture*, trans. by I. D. Rowland, commentary and illustrations by T. N. Howe, additional material by I. D. Rowland and M. J. Dewar, (Cambridge and New York: Cambridge University Press, 1999).

<sup>5</sup> Iversen, *Legacy of Egypt*, “The Canonical Tradition.” 76, 78-79. These common correspondences need be explored further and checked thoroughly.

<sup>6</sup> Vitruvius, *Ten Books of Architecture*, I.III.1-9.

<sup>7</sup> Stewart, “Nuggets,” 275.

<sup>8</sup> J. E. Raven “Polyclitus and Pythagoreanism,” *The Classical Quarterly*, New Series 1.3/4 (1951), 147-152; Stewart, “The Canon of Polykleitos,” 127,130-131; Stewart, “Nuggets,” 274-275; Gregory Vincent Leftwich, “The Canon of Polykleitos: Tradition and Content” in *Canon. The Princeton Journal: Thematic Studies in Architecture* 3 (1988): 37-78; Peter Kidson, “The Figural Arts” in *The Legacy of Greece: A New Appraisal*, ed. M. I. Finley (Oxford: Oxford University Press, 1981), 416-417 discusses more generally the apparent close relationship between canons and Pythagoreanism.

<sup>9</sup> Leftwich, “The Canon of Polykleitos,” 68-74.

<sup>10</sup> Plato, *Protagoras*, Greek with English trans. by W. R. M. Lamb, *Plato, IV*, Loeb Classical Library (London and Cambridge, MA: Harvard University Press, 1952), 328c.

<sup>11</sup> Plato, *The Statesman; Philebus*, Greek with English trans. by Harold N. Fowler, *Plato, VIII*, Loeb Classical Library (London and Cambridge, MA: Harvard University Press, 1975), 55e.

<sup>12</sup> Plato, *Philebus*, 64d-66b.

<sup>13</sup> Plato, *Philebus*, 64e.

<sup>14</sup> Plato, *Philebus*, 64e-65a.

<sup>15</sup> Plato, *The Republic*, Greek with English trans. by Paul Shorey, 2 vols., Loeb Classical Library (Cambridge, MA: Harvard University Press, 1953-1956), VI.484d.

<sup>16</sup> Leftwich, *Ancient Conceptions*. Leftwich, “The Canon of Polykleitos;” Leftwich, “Polykleitos and Hippokratric Medicine” in *Polykleitos, the Doryphoros, and Tradition*, ed. Warren G. Moon (Madison, WI, and London: University of Wisconsin Press, 1995), 38-51.

<sup>17</sup> Leftwich, *Ancient Conceptions*; Leftwich, “The Canon of Polykleitos.”

<sup>18</sup> Galen, *De placitis Hippocratis et Platonis*, v, 448, trans. in Stewart, “Canon of Polykleitos,” 125, 125 fn.23, and correction on 131.

<sup>19</sup> Stewart, “Canon of Polykleitos,” 131.

<sup>20</sup> Vitruvius, *Ten Books of Architecture*, I.III.1-9.

<sup>21</sup> Vitruvius, *Ten Books of Architecture*, I.III.1-9.

<sup>22</sup> Raven “Polyclitus and Pythagoreanism;” Stewart, “The Canon of Polykleitos,” 127,130-131; Idem, “Nuggets,” 274-275; Leftwich, “The Canon of Polykleitos;” Kidson, “The Figural Arts,” 416-417 discusses more generally the apparent close relationship between canons and Pythagoreanism.

<sup>23</sup> Stewart, “The Canon of Polykleitos,” 130, 130 fn.54; R. R. Stieglitz, “Classical Greek Measures and the Builder’s Instruments from the Ma’agan Mikhael Shipwreck,” *American Journal of Archaeology* 110.2 (2006), 195 fig.4. Available on the web through <http://www.ajaonline.org/>.

<sup>24</sup> Leftwich, “The Canon of Polykleitos,” 66.

<sup>25</sup> Stewart, “The Canon of Polykleitos,” 130.

<sup>26</sup> G. L. Hersey, *The Evolution of Allure: Sexual Selection from the Medici Venus to the Incredible Hulk* (Cambridge, MA, and London: MIT Press, 1996); Hersey, “Beauty is in the eye of a Greek chisel holder.” *Times Higher Education Supplement* n.1230 (May 31, 1996): 16-17; N. Etkoff, *Survival of the Prettiest: The Science of Beauty*, Anchor Book edition, (New York: Anchor Books, 1999, 2000), 15-18, 140-147.

