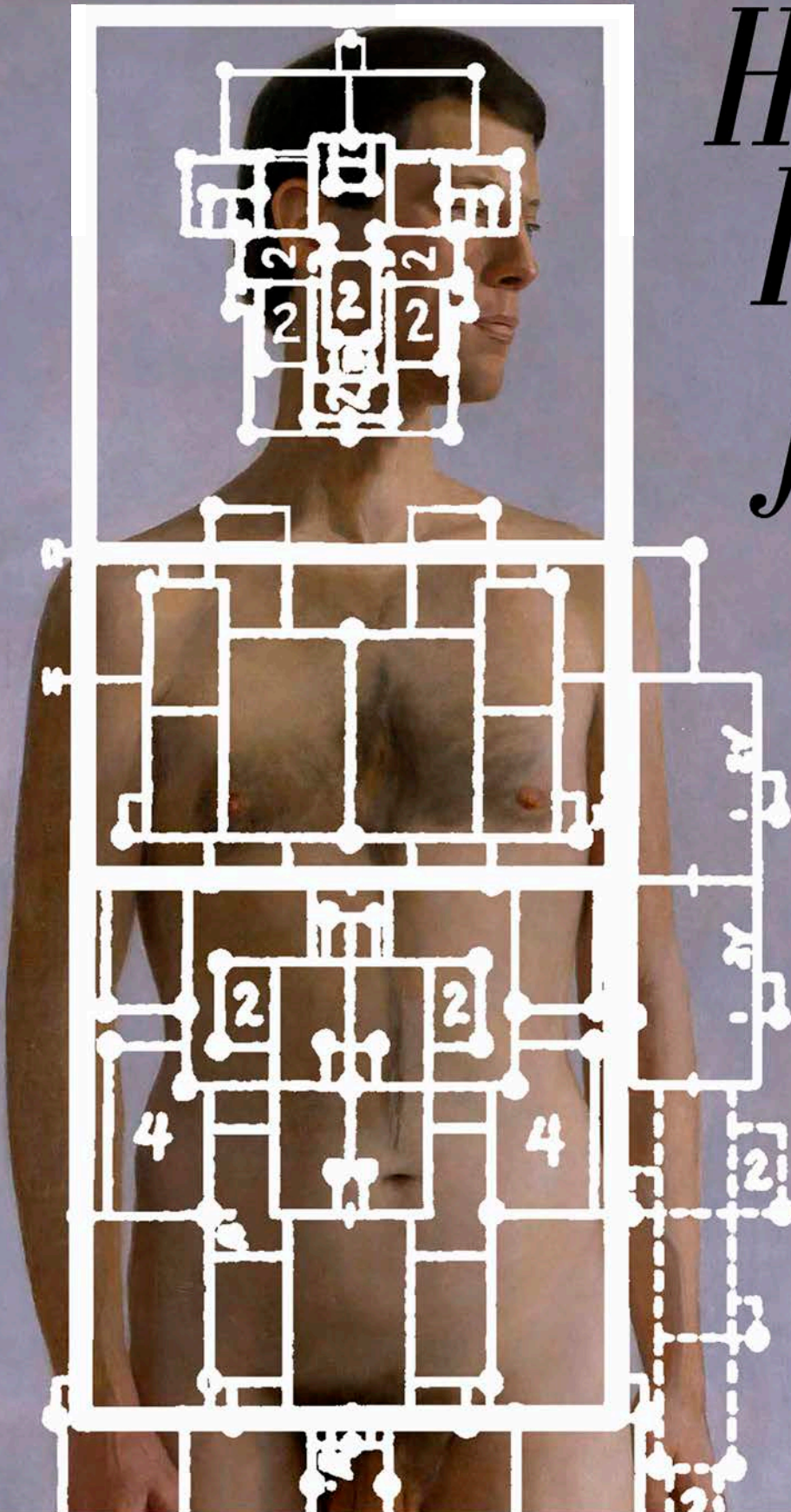


How High for How Wide?

REVEALING THE
GOLDEN SECTION
IN GREEK SCULPTURE
AND WITHIN US ALL

*Francis
Cunningham*



ON THE COVER:

A 1959 diagram of Golden Section rectangles overlaid on a detail of Francis Cunningham's painting, *Patrick*, 1973-1975

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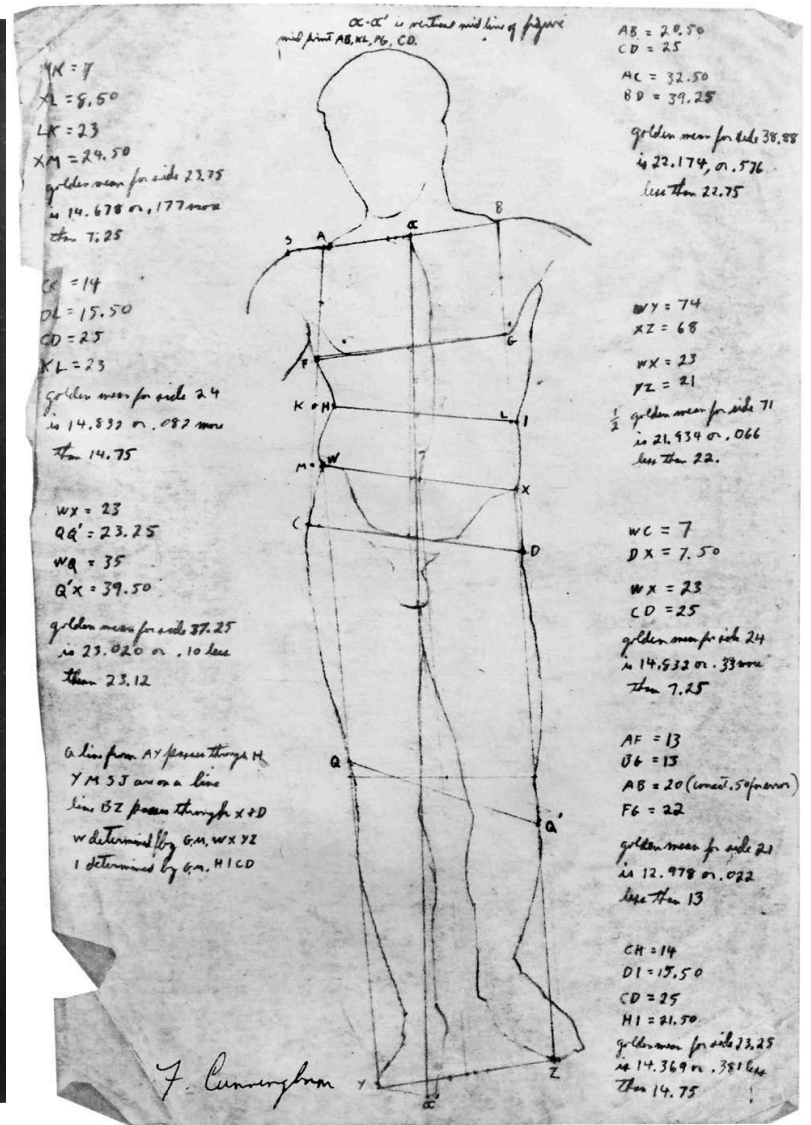
Edited by William Anawalt

Design by Sean Kelly

“The parts... must have some measurable relation to one another: there must be a canon of proportion. We know that Polykleitos composed such a canon, but all that has come down to us is the tradition of a few elementary rules — seven-and-a-half heads to a figure, and so forth; and attempts to rediscover the canon by measuring his figures have been unsuccessful probably because it was geometrical, not arithmetical, and so is extremely difficult to reconstruct.”

KENNETH CLARK

The Nude: A Study in Ideal Form, Bollingen Series,
Princeton University Press, 1956



THE DIADOUMENOS OF POLYKLEITOS and CUNNINGHAM'S DIAGRAM OF QUADRILATERALS, 1959

The photograph, at left, was the basis for Cunningham's initial tracing of quadrilaterals in the Diadoumenos, showing Golden Section relationships of height to width.

$$XK = 7$$

$$XL = 8.50$$

$$LK = 23$$

$$XM = 24.50$$

golden mean for side 22.75
is 14.678 or .177 more
than 7.25

$$CK = 14$$

$$DL = 15.50$$

$$CD = 25$$

$$KL = 23$$

golden mean for side 24
is 14.832 or .082 more
than 14.75

$$WX = 23$$

$$QQ' = 23.25$$

$$WQ = 35$$

$$Q'X = 39.50$$

golden mean for side 37.25
is 23.020 or .10 less
than 23.12

a line from AY passes through H

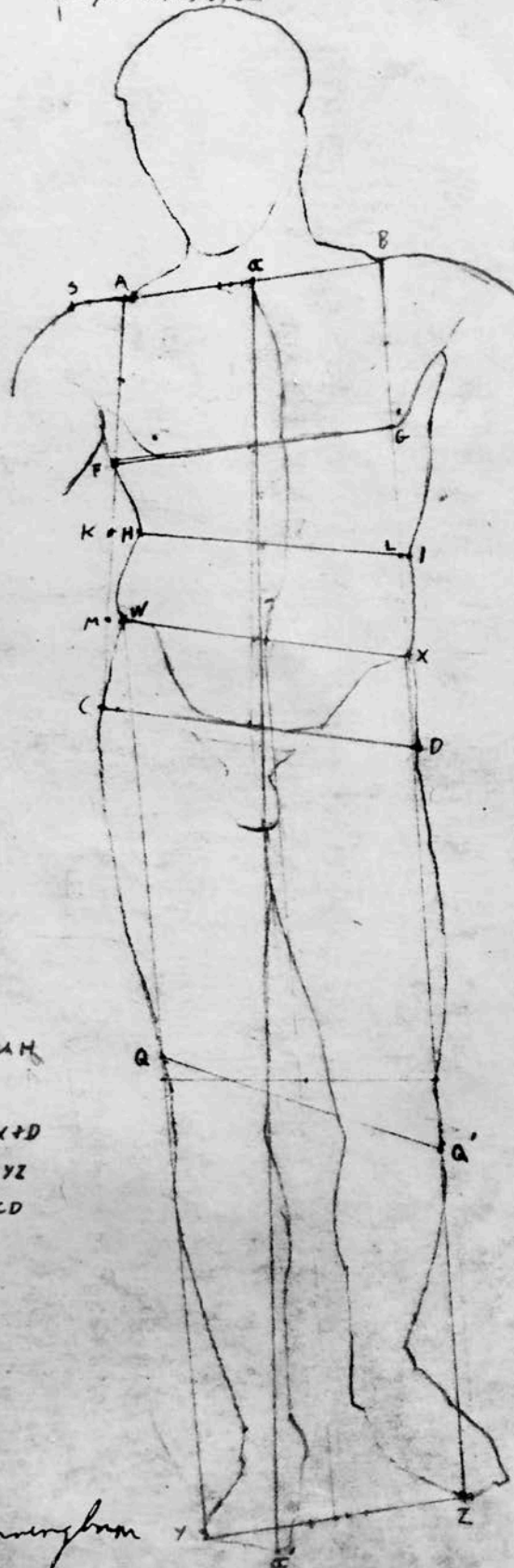
YM 5J are on a line

line BZ passes through X + D

W determined by G.M. WX YZ

I determined by G.M. HICD

$\alpha - \alpha'$ is vertical mid line of figure
mid point AB, KL, PG, CD.



$$AB = 20.50$$

$$CD = 25$$

$$AC = 32.50$$

$$BD = 39.25$$

golden mean for side 38.88
is 22.174, or .576
less than 22.75

$$WY = 74$$

$$XZ = 68$$

$$WX = 23$$

$$YZ = 21$$

$\frac{1}{2}$ golden mean for side 71
is 21.934 or .066
less than 22.

$$WC = 7$$

$$DX = 7.50$$

$$WX = 23$$

$$CD = 25$$

golden mean for side 24
is 14.832 or .33 more
than 7.25

$$AF = 13$$

$$BG = 13$$

$$AB = 20 \text{ (correct .50 from error)}$$

$$FG = 22$$

golden mean for side 21
is 12.978 or .022
less than 13

$$CH = 14$$

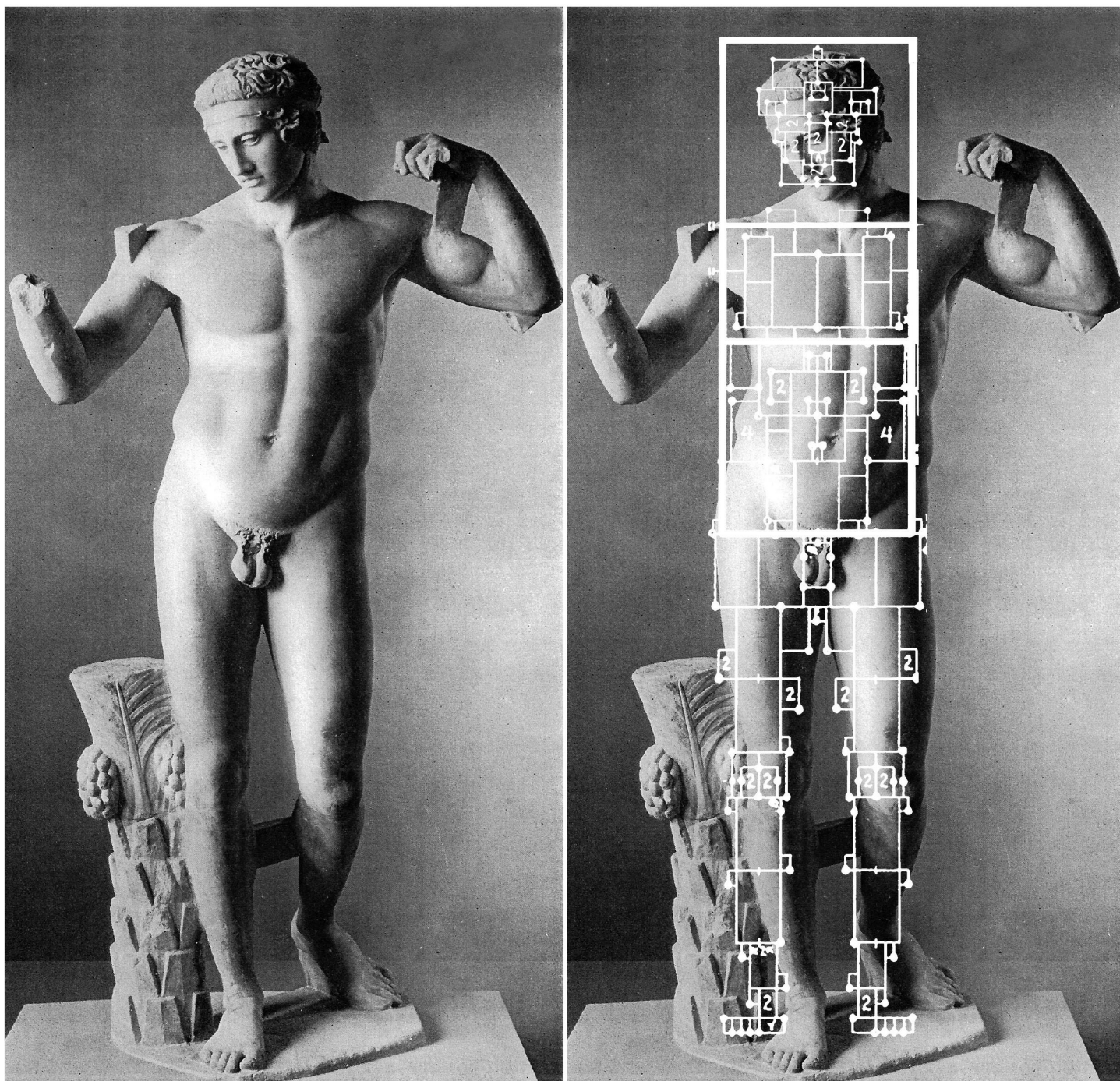
$$DI = 15.50$$

$$CD = 25$$

$$HI = 21.50$$

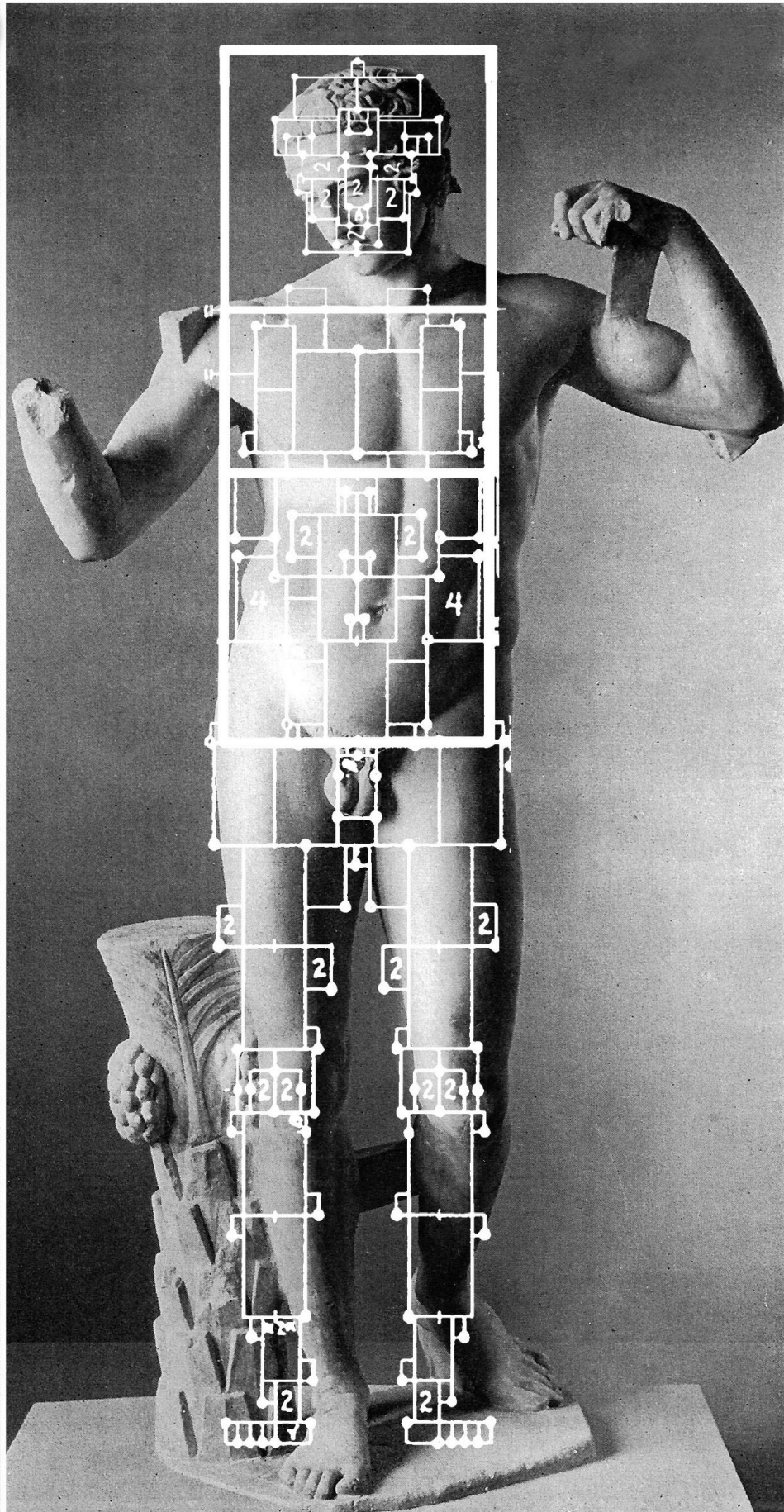
golden mean for side 23.25
is 14.369 or .381 less
than 14.75

F. Cunningham



**THE *DIADOUMENOS* OF POLYKLEITOS and CUNNINGHAM'S OVERLAY
OF GORDON'S GOLDEN SECTION RECTANGLES, 2018**

The photograph, at left, was the basis for Cunningham's later overlay of the rectangles in the *Diadoumenos* showing Golden Section relationships of height to width.



CUNNINGHAM'S OVERLAY OF GORDON'S ORIGINAL GOLDEN SECTION RECTANGLES, 2018

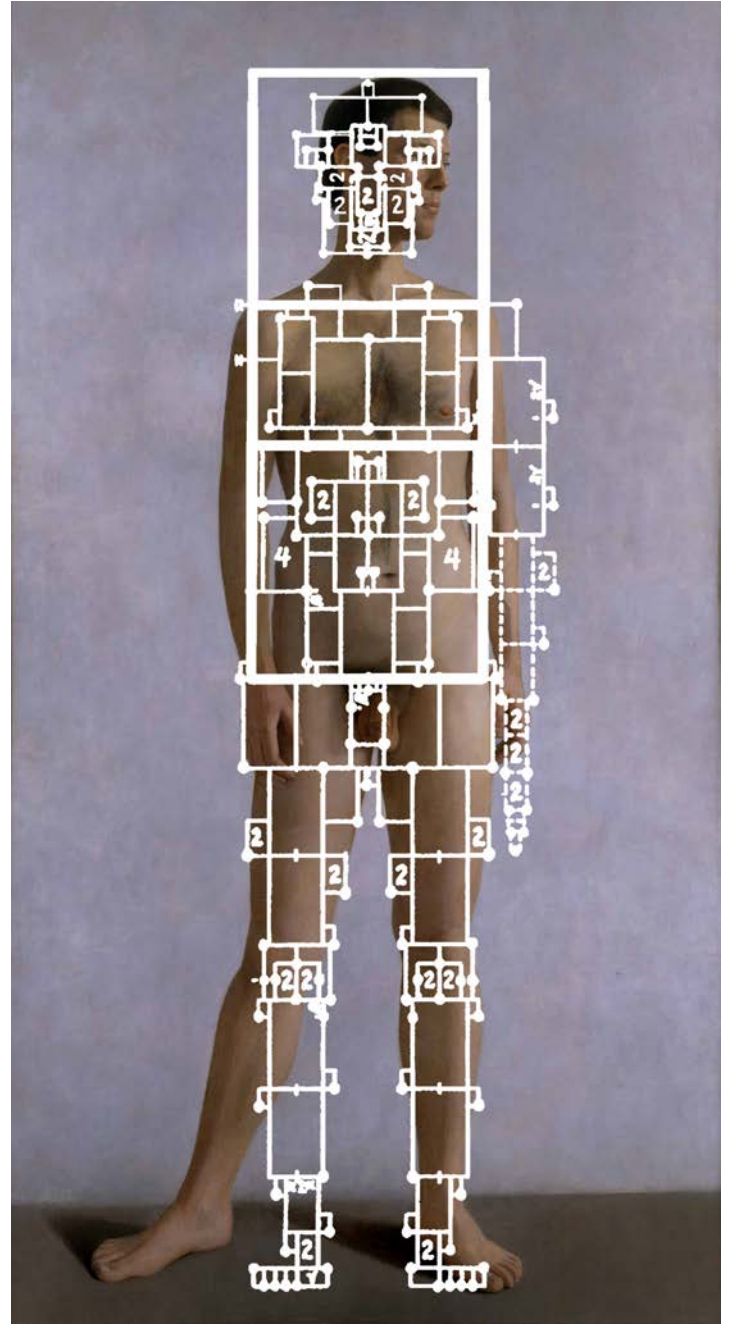
THE START

This diagram of quadrilaterals from 1959 marks the beginning of a lengthy journey into Greek proportion. The opening stages, summarized here, have been spelled out in more detail in Chapter 9 of *Unframing the Nude*.

After leaving art school, eager to paint the human figure and understand its proportions, I saw anatomical points on a frontal photograph of the Polykleitos Diadoumenos that appeared to be geometrically harmonic — I saw them as quadrilaterals that relate height to width. They felt harmonic to me, and so they proved to be.

Just out of art school (the Art Students League), I was sharing a studio with a college classmate, Donald E. Gordon (1931-1984). He knew that the Golden Section was familiar to the Greeks and he looked up and confirmed the math. When I divided the sum of the short sides into the sum of the long sides of a quadrilateral the result was a fraction or a multiple in the Golden Section ratio: .6180339....

The measurements are listed to the left and right of the diagram, which I drew on tracing paper placed over the photograph. My excitement was immense. This broke with everything I had learned about human proportion, which was the linear division of the body into heads.



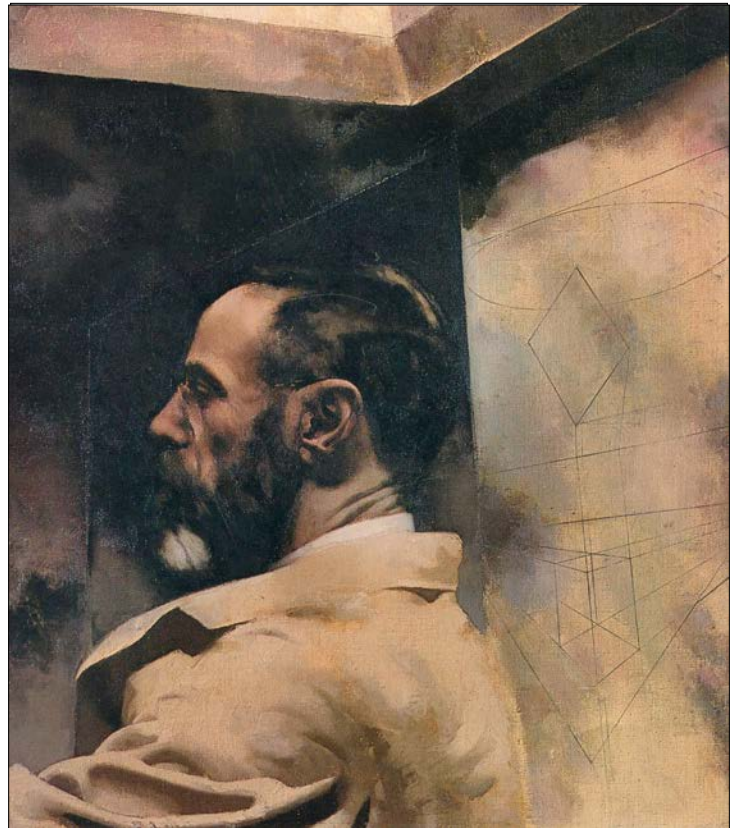
CUNNINGHAM'S PAINTING OF PATRICK WITH GOLDEN SECTION OVERLAY

Patrick, Francis Cunningham, 1973-1975,
80 x 44 inches, Oil on canvas, Collection of the artist

I had learned from my painting instructor, Edwin Dickinson, at the Art Students League that the proportions of any given shape — a human hand, head or leg, a cloud or an apple — is determined by its height in relation to its width. This is a geometric understanding of proportions. I am certain that the visual training in the Dickinson class led directly to seeing and sensing a harmonic and rational means of organizing geometrically related height to width relationships in Polykleitos' Diadoumenos.

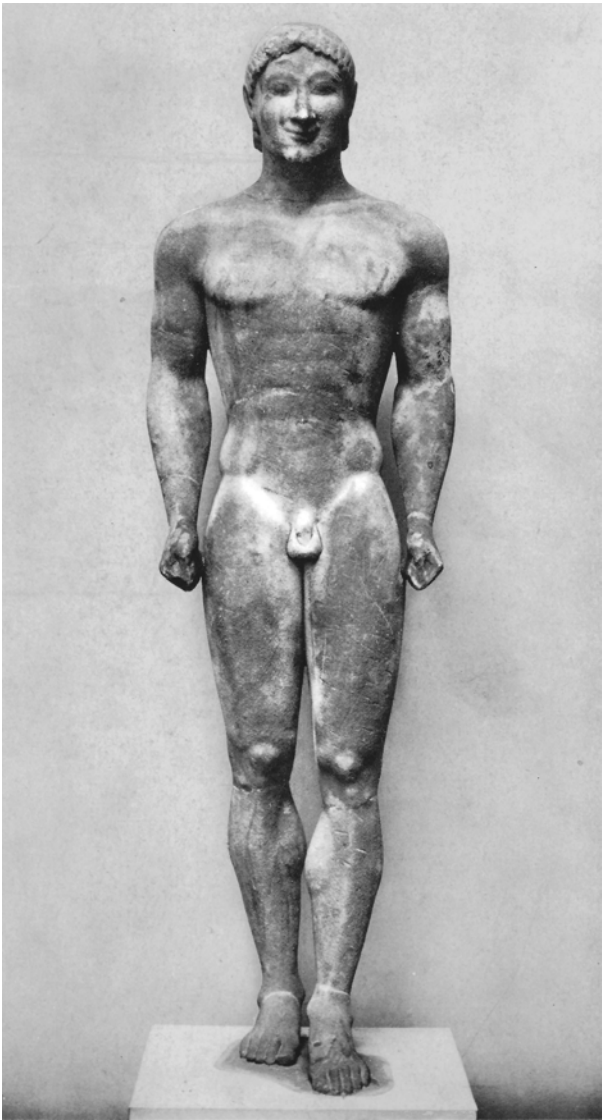
Upon completing this initial quadrilateral diagram, my first thought was “this has to be Greek” and immediately I measured a photograph of the Kouros from Attica, Munich ca. 520 – 510 BCE, while Gordon measured a sculpted head from the Hellenistic period. Both showed the Golden Section in their proportions. We were on our way.

The idea of the small parts being in harmonic relationship to a larger whole is deeply ingrained in human nature and in nature itself, but there are more dimensions to Greek sculpture than any definition of proportion can encompass: there are “gods” represented in human form. These gods are powerful forces, beyond human control but present within the world of reason and geometry. They are presences that exist simultaneously beyond the world, in and on the earth. This is the world in which Socrates lived, and Polykleitos. The Greeks sacrificed to these gods; that is what their temples are about. With the Greeks, geometry is tied both to the gods and to humankind. But so it is with us. The particular forces embodied in the gods, together with geometry, are present in the human body, in the human mind and spirit, now as with the Greeks. Although their presence varies with every individual, the gods are here – Venus, Apollo, Vulcan, Athena, Hera, Zeus – in the positives and negatives of individual human character, physical, mental and emotional. These forces are not idle gentle presences. Along with the positives of love and mercy they include the seven deadly sins. Love and mercy themselves can become violent. I myself have known two mercy killings for which I do not have the heart to judge. In varying proportions, the passions and peccadillos of the human race are present in individuals — the noble bearing, ‘the sneer of cold command’ and the lesser staples



SELF PORTRAIT
Edwin Dickinson, 1945

of feeling. Whatever one thinks of him, Sigmund Freud understood the presence of these forces in human beings. Try as we may they cannot be hidden. They are subtly present in the how-high-for-how-wide of the body's gestures and its posture. For us today they are present in the visible geometry of every particular body, but without



KOUROS FROM ATTICA
Munich, ca. 520 – 510 BCE
(See diagram on next page)

Greek names or Greek proportions. Are their proportions discerned and how are they to be handled?

These forces are no less powerful and present in the human body today than they were in Greece: it is just that their connection with the cosmos and geometry has been replaced with subjectivity and in the age of abstraction we have become blind to their actuality and objective presence in the geometry of the particular body. The intimate connection between the gods and visual geometry explains to me the revelation I had in Naples on first seeing a Phidian replica of the head of Athena. Among her warlike attributes, Athena was also the goddess of wisdom. In looking at this sculpted head I saw and understood for the first time that wisdom is benign and gentle. It was a shock. This was emotionally convincing and real, experienced not as a thought or an idea. No wonder Plato banned sculpture from his Republic!

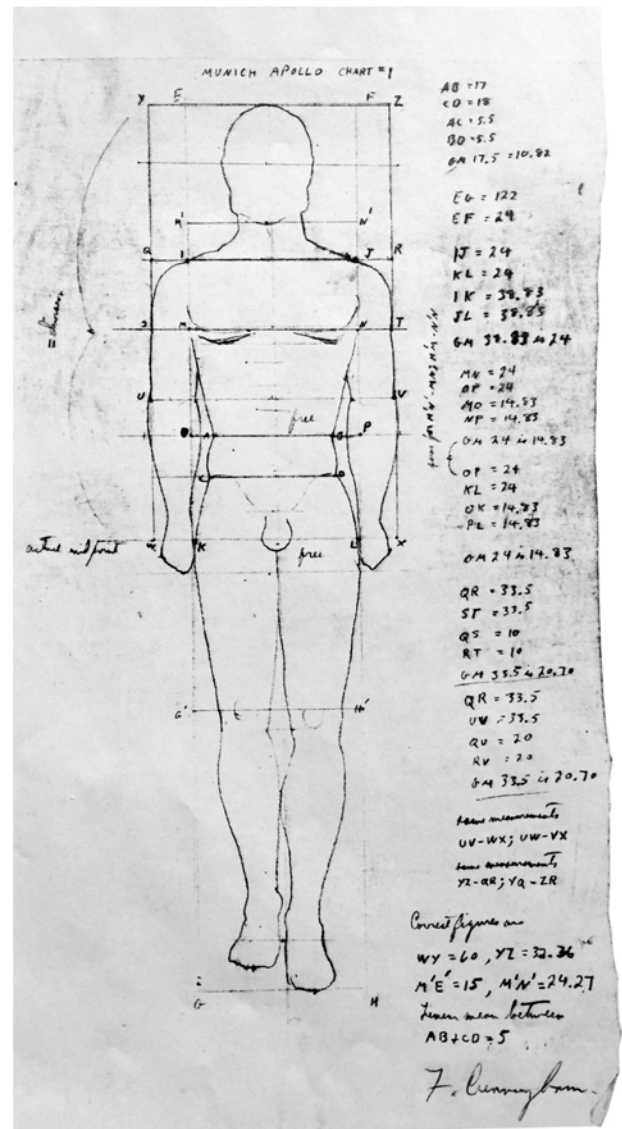
What my nudes have in common with Polykleitos and Greek sculpture lies not in the narrative, storytelling aspects of the human body

or its idealized harmonic proportions but in a simple visual fact: there is no single, fixed station point that anchors the viewer and governs the whole. This fact — there is no single, fixed station point — is what necessary to the creation of an anatomically functional figure. It opens the door to objective proportions, and that

frees us to view the human body in a way that was inaccessible to the Renaissance, with its single controlling station point and linear perspective. Today we are free also from the restrictions inherent in the idealization imposed on the body's proportions by Greek geometry. This essay explains how I came to these understandings and how they relate to a contemporary nude.

Donald Gordon and I continued to measure. Gordon would soon determine that the proportional measurements could be expressed directly in rectangles – Golden Section rectangles. We continued our work for some time but I had enough of measuring, and in due course I would leave Gordon to resume painting. He continued measuring the Diadoumenos' proportions and later would become an art historian. In 1962 we published an article for which he was principal author. I had readily agreed to being second author. The diagrams, which are entirely his, along with an accompanying text, were published in *The Art Quarterly*, Summer 1962, in an article entitled, "Polykleitos' 'Diadoumenos': Measurement and Animation." I did not see the article until after it had been accepted. Unfortunately, *The Art Quarterly* would allow no more diagrams or additional pages of text. Although I knew that more work was required and although we reworked the text, there was no help for it – neither of us were prepared to make additional diagrams or text and so we determined to let the article stand as is.

I continued as a painter and Gordon as an art historian. He died in 1984. A lifetime of lingering dissatisfaction would lead me in 2018 to look again at Greek sculpture and resume the investigation of proportion, searching for and finally



CUNNINGHAM DIAGRAM, 1959

Kouros From Attica, Munich

Note the vertical and horizontal grid developing from the body's anatomy in this Archaic statue, which is proof that it is Greek.



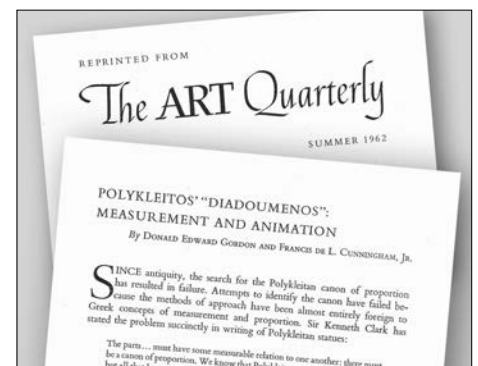
DONALD E. GORDON
Circa 1965

finding the canon's missing width. Aside from their complexity, I knew that the chief difficulty in Gordon's original diagrams is the fact that although the overall height of the canon is broken down into units of a Golden Section progression, nowhere is the overall width of the canon indicated. I would find this width – 3 *epsilon* – present but unrecognized by us in Gordon's diagrams. It had been there all along, unseen. Also unseen were the large squares and Golden Section rectangles by which the canon is organized and to which all the smaller dimensions of the body relate. These I now have diagrammed. The reason to which I ascribe Gordon's and my blindness is, I believe, cultural. We see and think in a linear, arithmetic way, not geometrically and in terms of relationships, such as height to

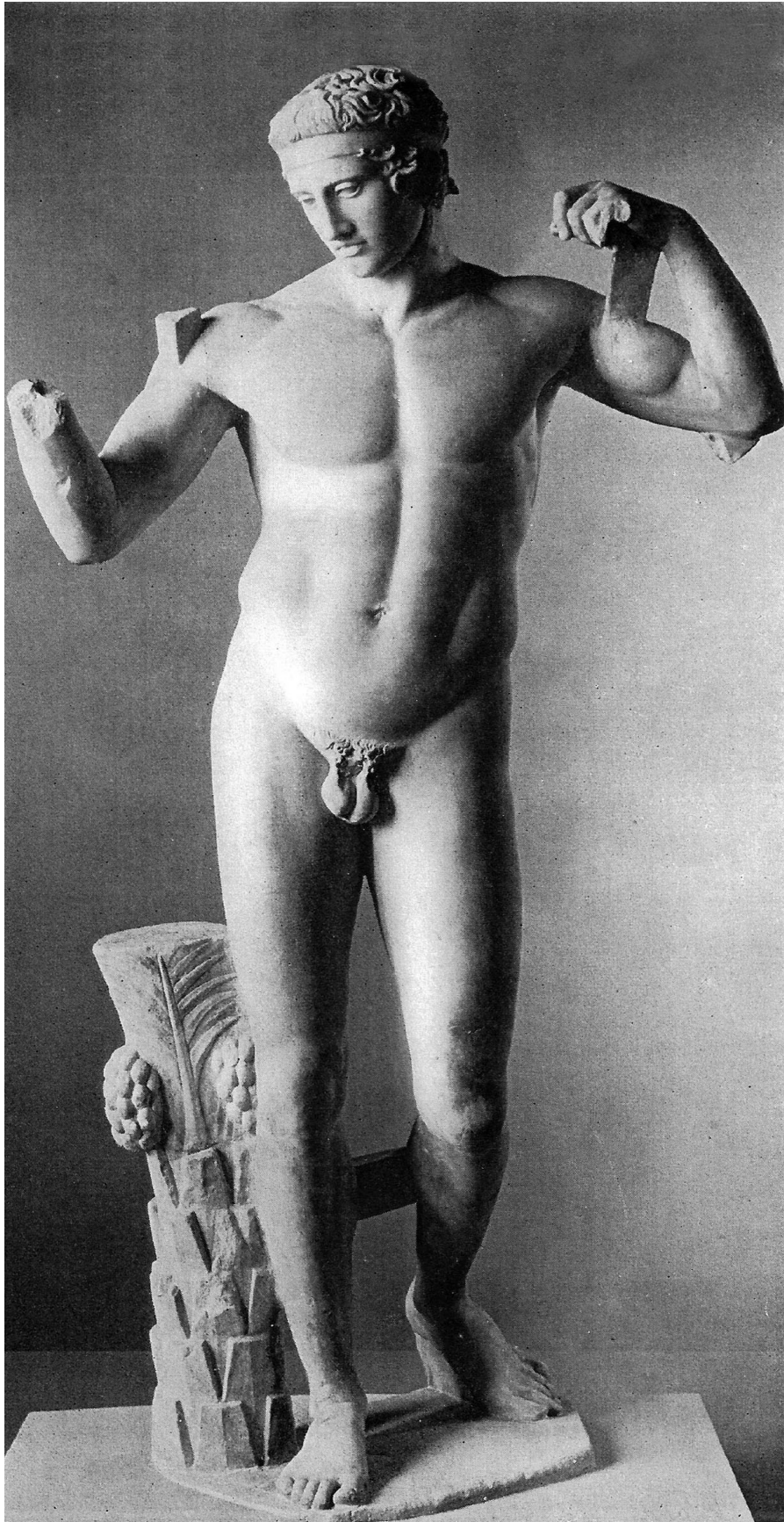
width. This is how we live our daily lives. That is how we saw.

The idea of small parts in a harmonic relationship to a larger whole may be deeply ingrained in human nature, and in nature itself, but it is not a principle that lives today on our front burner. It did for the Greeks, as we will see made evident in Polykleitos' Diadoumenos. I believe it will be found present and manifest throughout Greek sculpture and architecture, and that it points to a cultural outlook that exists in every facet of Greek culture. This I surmise, in the belief that educated guesses can lead to surprising discoveries.

The next chapter will chronicle and diagram a series of discoveries in Greek sculpture that determine how squares and rectangles are used in a geometric progression that relates each part of the body, one to another, in harmonic proportion. The key, or "secret," is in the Golden Section.



THE ART QUARTERLY, SUMMER 1962



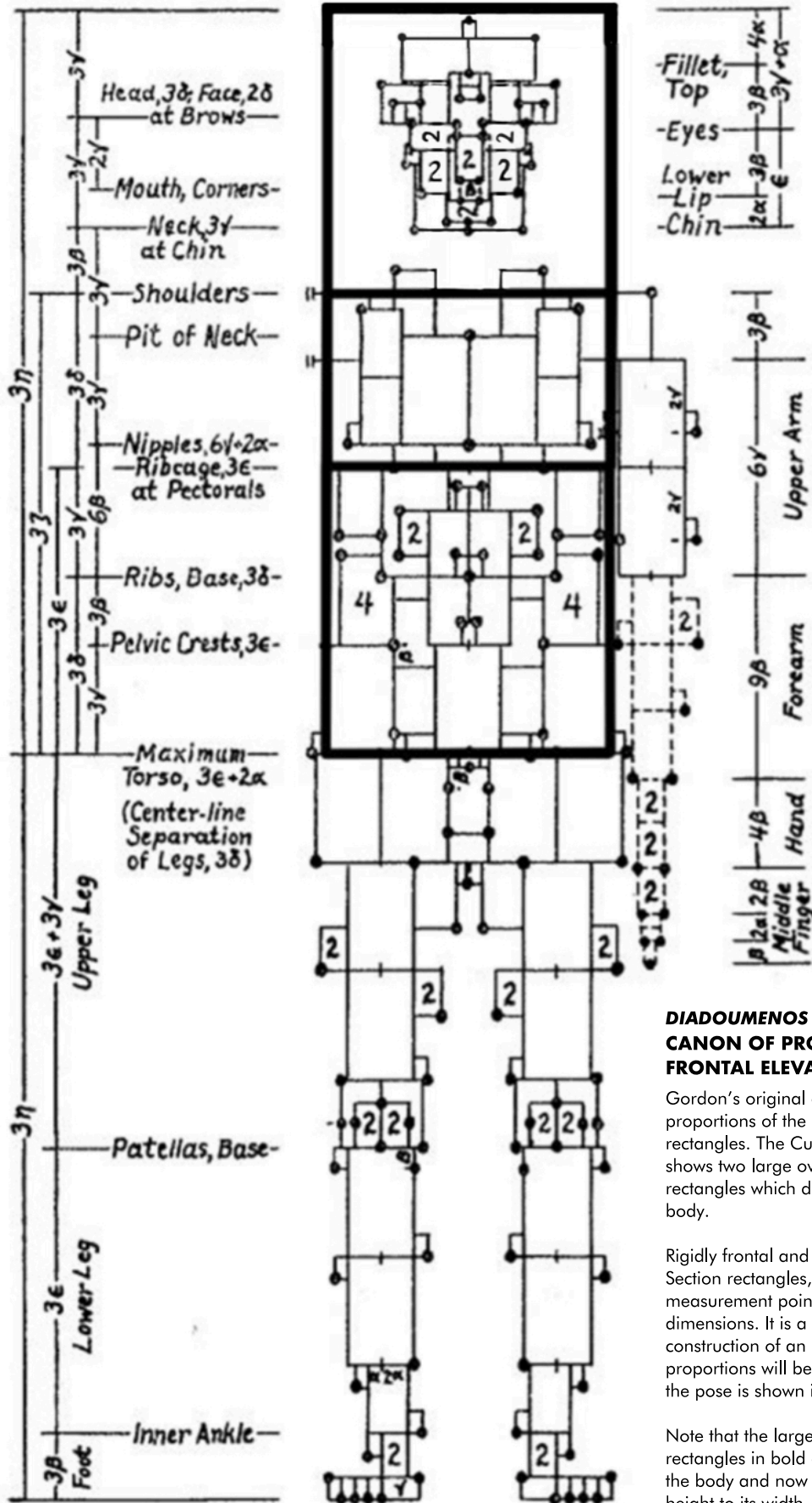
FRAGMENTS OF A MARBLE STATUE OF THE DIADOUMENOS

Roman copy of work attributed to Polykleitos, c. 69-96 CE

The Metropolitan Museum of Art, New York

This frontal photograph provided the foundation for Gordon's Golden Section rectangular measurements.

3ε

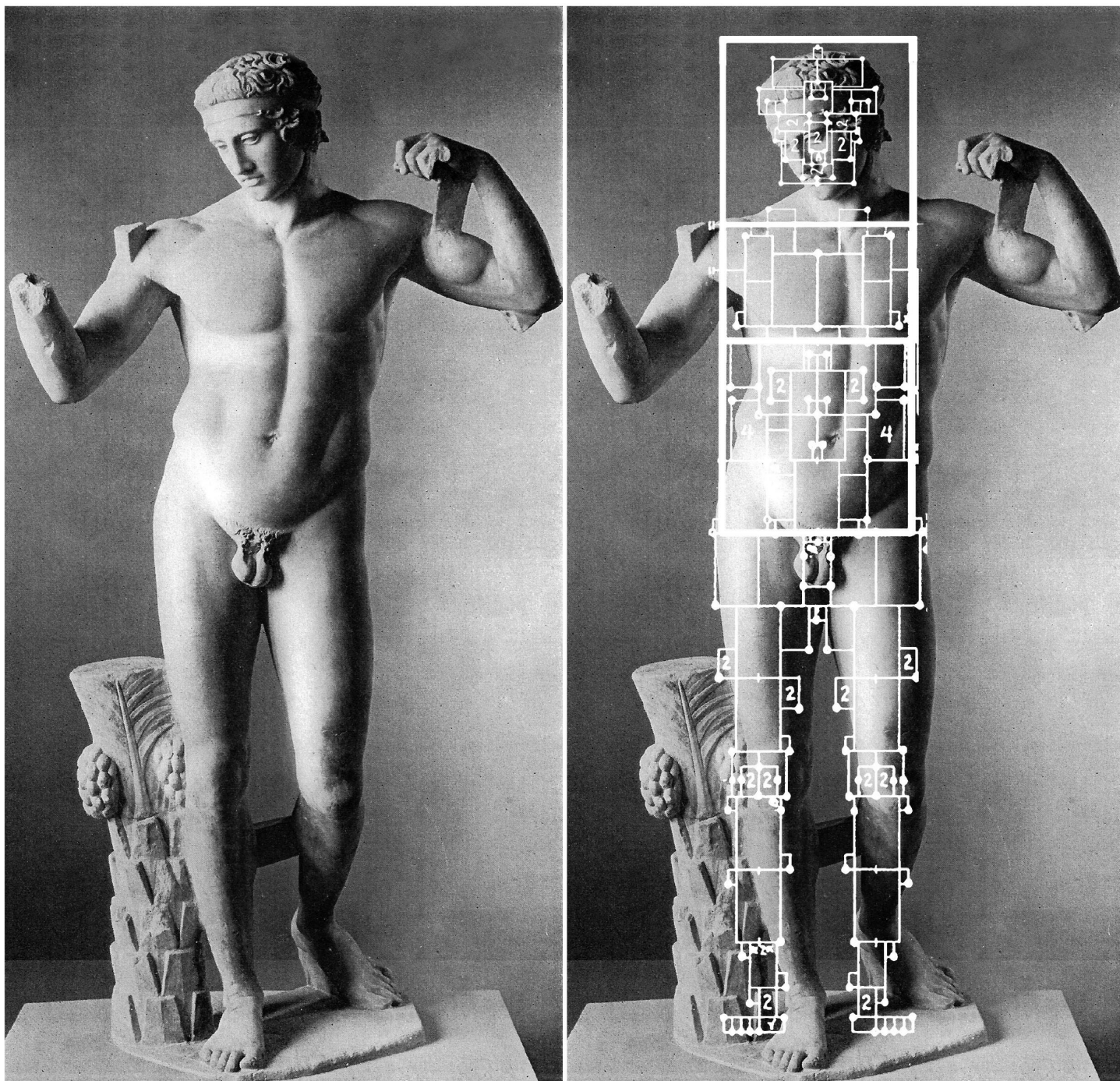


DIADOUMENOS CANON OF PROPORTION, FRONTAL ELEVATION

Gordon's original diagram, showing objective proportions of the body in small Golden Section rectangles. The Cunningham overlay in bold shows two large overlapping Golden Section rectangles which define the upper half of the body.

Rigidly frontal and erect, the canon's Golden Section rectangles, large and small determine the measurement points that constitute its 'objective' dimensions. It is a completely ordered, geometric construction of an ideal human body. How these proportions will be animated and transferred into the pose is shown in later diagrams.

Note that the large, overlapping Golden Section rectangles in bold define the entire upper half of the body and now relate the canon's overall height to its width.



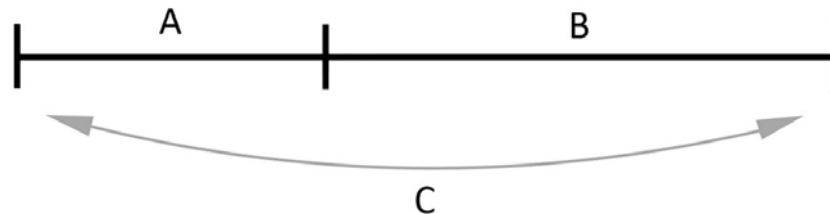
**DIADOUMENOS FRONTAL ELEVATION and CUNNINGHAM'S OVERLAY
OF GORDON'S GOLDEN SECTION RECTANGLES, 1959**

See Gordon's animation diagrams (pages 31 and 32) for how the canon will assume the pose on a frontal plane.

THE GOLDEN SECTION

To be clear, I am not a mathematician and this essay is not about mathematics. It is about visual harmonics, the harmonic relationship of parts of the body to one another and to the whole. That is what Polykleitos' sculpture is about and it is the aspect of Greek sculpture that we are taking up. Geometry is a means to this end.

With that said, we must examine the mathematics. The Golden Section is an extraordinarily versatile geometric progression which begins with the division of a line into two segments, so that the short segment is to the long as the long is to the sum of the two.



Line C divided into a Golden Section ratio: A is to B as B is to (A + B) = C

$A : B :: B : C$, where $C = A+B$;

$B : C :: C : D$, where $D = B+C$;

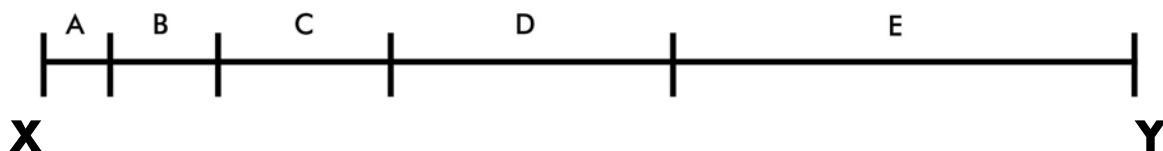
$C : D :: D : E$, where $E = C+D$, and so forth....

that translates to:

A is to B as B is to C, where C equals A plus B;

B is to C as C is to D, where D equals B plus C;

C is to D as D is to E, where E equals D plus C, and so forth...



GOLDEN SECTION

A line XY divided into Golden Section units

The first two segments, A and B, are the beginning of a geometric progression that can be continued in either direction, larger or smaller to infinity. One of the beauties of the Golden Section is that the microcosm, the first two segments, is always present in the macrocosm, which progressively constitutes every larger segment. Therefore, every larger term is reducible to a sum of the two smallest terms, A and B and the proportion will be maintained in simple multiples, such as:

$$\begin{aligned} 2A : 2B &:: 2B : 2C & (2A \text{ is to } 2B \text{ as } 2B \text{ is to } 2C) \\ 3A : 3B &:: 3B : 3C, \text{ etc.} \end{aligned}$$

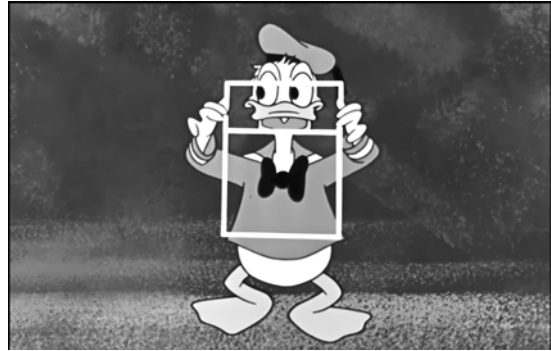
One could construct a ruler, or a line, with all the possible harmonic subdivisions. I have in fact done this in order to see what they look like and to visualize these intervals in comparison to our numeric rulers with standard mathematical intervals – inches or centimeters. Did Polykleitos use as a ruler, proportioned sticks of wood or metal rods, or knotted string? We shall never know. Various combinations of seven proportional sticks are what one would need to carry out the dimensions in Gordon's diagrams. They are what I have used, made of proportioned strips of cardboard, when designing paintings.

The "XY" line in Diagram #1 can be a line of any length. It will have a beginning and an end. What, if anything, do the beginning and end signify? They could represent the width of the stylobate of a Greek temple, or the height of a proportioned human figure, as seen in Gordon's canon. They could also just as well represent the height or width of your refrigerator. If you were to take the height of your refrigerator and divide it into a Golden Section, you could determine on the door a line for the freezer section that is proportional to the whole. You might also "create" a beautifully proportioned design on the door with reference to nothing other than itself. Disney was creative in a 1959 movie entitled "Donald [Duck] in Mathmagic Land," in which the Golden Section is discovered and placed on everything from the Mona Lisa to the kitchen sink.

If considered by itself alone with no context, the Golden Section means nothing beyond the abstract beauty of pure mathematics. When found in nature, as in the Fibonacci series, it can express itself in the spirals of a pinecone or the shell of a mollusk — organic beauty. When the human mind is involved, it may appear in a

work as profound as the Parthenon — or as commonplace as your refrigerator door. To what end has this versatile Section been put? How has it been organized? These, ultimately, are life choices.

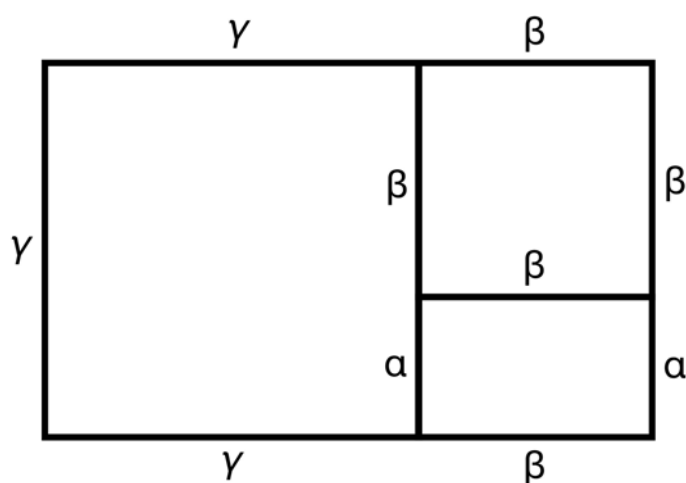
Gordon and I decided to label the Golden Section progression in the Diadoumenos with letters of the Greek alphabet: *alpha* (α), *beta* (β), *gamma* (γ), *delta* (δ), *epsilon* (ϵ), *zeta* (ζ) and *eta* (η). They are a signal with a built-in meaning: a geometric progression that has an arithmetic component. We would use the Roman alphabet for purposes of ordinary description.



DONALD IN MATHMAGIC LAND
Walt Disney Studios, 1959

THE GOLDEN SECTION RECTANGLE

The key unit of construction in these diagrams is the Golden Section Rectangle. Every GS rectangle by itself alone, harmonically relates height to width; it also permits interdependent harmonics, as we see in the diagrams of the *Diadoumenos* frontal canon. This interdependence is why the quadrilaterals in my initial diagram of the *Diadoumenos* had a common factor of .6180339....



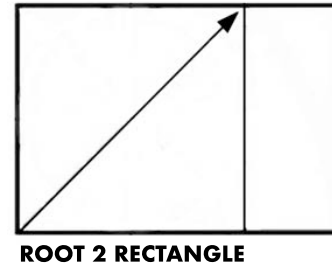
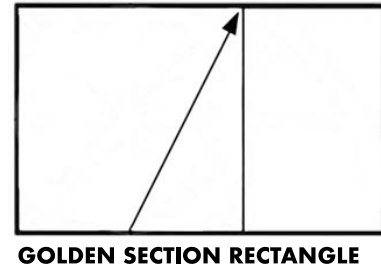
GOLDEN SECTION RECTANGLE

Subdivisions within a Golden Section rectangle —
a large square, a smaller square and a smaller Golden Section rectangle

One may ask why do I need to know how to make a Golden Section rectangle when I can see and read about it? The answer is that if one wants to know and understand a shape you must draw it, make it and come to love that shape. Then you may discover dynamics that were hidden when someone else did the work. I am a case in point: although I had worked with the Golden Section in Greek sculpture and my own painting for many years I did not come to grips with its dynamics until 2018, when I returned to Greek proportion and did exactly what is outlined here — draw and live every step in the making of a Golden Section rectangle.

A Golden Section rectangle may be constructed (one way among others) by taking a square and drawing a diagonal from one corner to one-half of the opposing base. Use a compass and add the length of this new dimension to the base. Erect a perpendicular and complete the rectangle. This will be a Golden Section rectangle in which the short side is to the long as the long is to the sum of the two sides. Every

Golden Section rectangle may be divided into two geometric shapes with one of them a square constructed from the short side of the rectangle. It seems magical, but the smaller rectangular portion that remains also will be a Golden Section rectangle. Having the same proportions as the larger shape, this division can be made again and again, on into infinity. The proportion can be made to expand as well as contract: simply add a square to the longest side and the microcosm becomes the blueprint to the macrocosm.

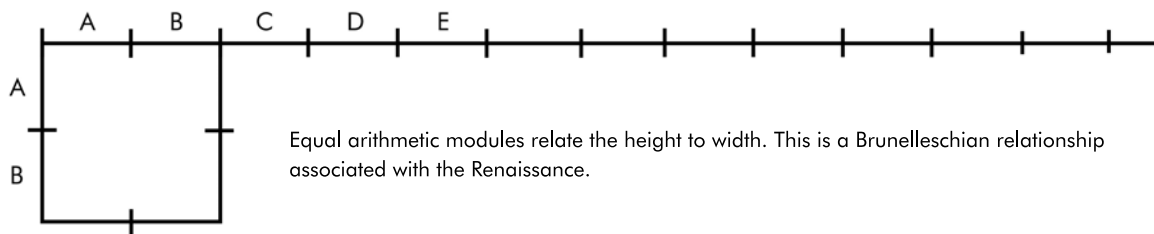


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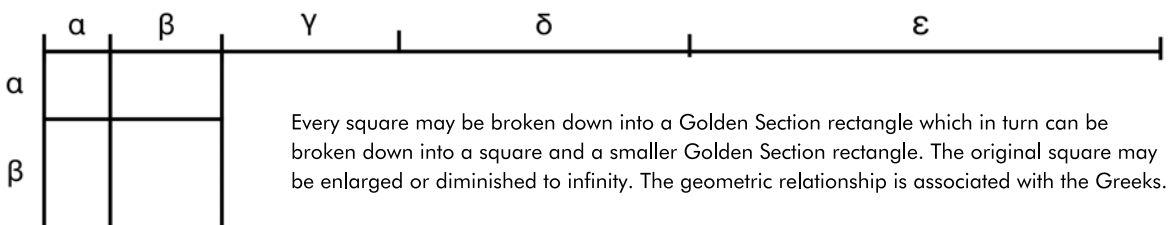
LINEAR ARITHMETIC AND GEOMETRIC MODES

My thesis concerning measurement and proportion - linear and geometric modes — which is outlined here, is ultimately simple. We will refer to examples of both throughout this chapter.

LINEAR ARITHMETIC MODE (Static) = BRUNELLESCHIAN



GEOMETRIC MODE (Dynamic) = GREEK



In the linear mode, A B C D E are static dimensions that can be used in creating arithmetically proportioned geometric shapes. This is the Vitruvian body broken down into heads. In the geometric mode, $\alpha \beta \gamma \delta \varepsilon$ are dynamic. They may be expanded or contracted to infinity. Because they are harmonically proportioned in relation to one another, this harmonic will be present in the creation of any geometric shape in which a Golden Section is employed.

- For the Greeks, proportions in the human body and in architecture are determined by geometric modules created by a Golden Section or other geometric progressions.
- Renaissance proportions, which continue in use into the present, are linear and determined by arithmetic modules: “heads” for the painted or sculpted body, inches, feet, centimeters, meters, etc. for engineering and architecture.

Greek and Renaissance artists both use geometry, but in different ways. In the Renaissance, space and shapes are organized geometrically by Brunelleschian perspective. The body is conceived three dimensionally in the form of architectural blocks or cylinders located in space and positioned by means of Brunelleschian perspective, in which the body and its parts are positioned to be seen from a single station point (the artist / observer’s eye). Compare this concept with what we have been describing here, which requires multiple station points in order to retain the canon’s objective proportions undistorted by perspective when the figure moves. The body now can be anatomically functional. The observer’s eye is free to move about and see each part of the body in its objective proportions, harmonically related to the whole. The Golden Section harmonic therefore can be retained and expressed in whatever the position of the body.

How this was done I will take up in detail, as well as continue to discuss the advantages and limitations in both modes, considered from a contemporary viewpoint. In their different ways, both preclude the possibility either of a nude based on the specific proportions of an individual human being – the Greek – or able to function anatomically and suggestively change position – the Renaissance.

My thesis concerning linear and geometric modes, which is illustrated above, opposes the static linear measurement of inches, centimeters, etc. with dynamic

geometric measurement. Each has its virtues and limitations. The harmonics of a Parthenon cannot be duplicated with a linear scheme of measure, and one cannot span an irregular ground and construct a bridge or aqueduct with geometric measure. Such work requires linear, arithmetic units of measure for their construction.

Proportion is a preeminent concern in Greek sculpture; one sees it developing from its Archaic beginnings into the Classic period and beyond. A high point occurred in approximately 450 BCE when Polykleitos sculpted the *Doryphoros*, an athlete holding a spear. This sculpture was renowned in antiquity for the natural posture and ease of its pose. It was known as "The Canon." This term means far more than the simple identification of a preeminent statue; it refers here to a rule or principle that sets a model for ideal harmonic proportion in the human body. As Kenneth Clark has noted, the way in which the Polykleitan canon was constructed has remained a mystery — nothing of substance has been passed on from antiquity — and yet the perfection of its proportion continues to move us to this day. The diagrams included in this chapter will challenge that mystery (Gordon's original 1962 diagrams have been refocused by me for this essay).

The sculpture I originally worked from — the *Diadoumenos*, an athlete tying a file around his head — was a later companion piece to the *Doryphoros*. This was because I needed a frontal photograph from which to measure, and the images of the *Doryphoros* available at the time were oblique. The proportional schema in both statues would appear to be identical.

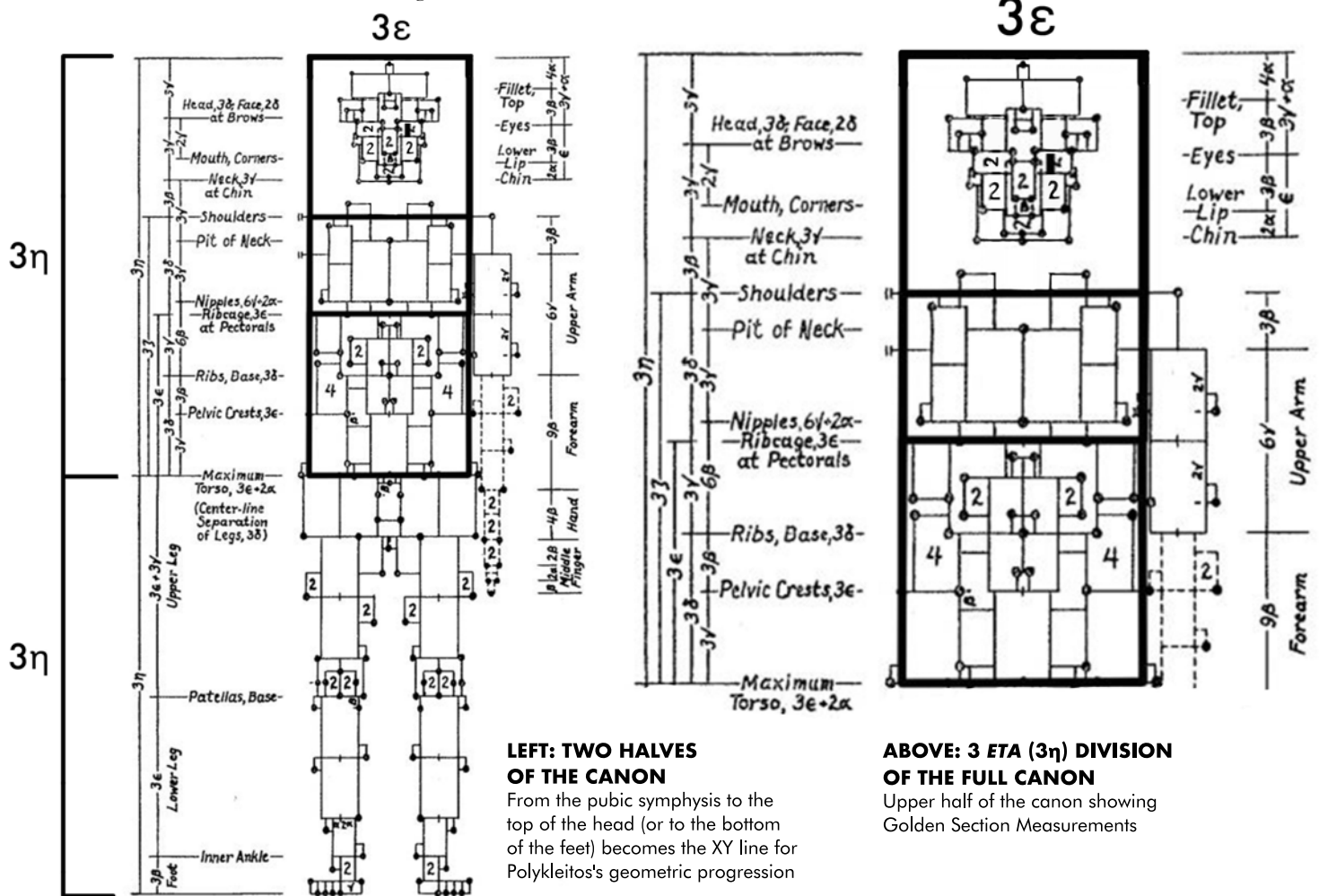
HOW THE GOLDEN SECTION PLAYS OUT IN THE POLYKLEITAN BODY: OBJECTIVE PROPORTION

Every rectangle relates height to width. With the Golden Section rectangle, because the smallest unit in the geometric progression is present in all the larger dimensions, every rectangle is harmonically related to every other rectangle. Gordon has indicated the measuring points determined by Golden Section rectangles which describe the body's anatomy. This means that every part of the body is harmonically related to every other part, and it explains how the Golden Section was found present in every quadrilateral in my initial diagram. It means that in the Polykleitan body the little toe is geometrically related to the thumb, the thigh, the nose, the ear, a forefinger. This is an extraordinary fact. It is interesting to speculate what Leonardo, Michelangelo or Raphael would have done with this.

The parts of the Polykleitan body are measured in Golden Section rectangles stacked one on top of the other forming an upright, rigid canon. That means each part of the body is determined in its true, "objective" proportions. These rectangles must then be animated and transferred into the three-dimensional pose, first on the frontal plane and then turned so as to describe the pose in space. This means that the "technical" proportions used by the sculptor to create the statue, will retain the "objective" proportions determined in the canon. How this will be done will be illustrated and described in this chapter. The "idea" embodied in the proportion of the canon – a harmonic relationship among all the parts – is now made actual in the statue. Ideal form has become realized concretely.

Gordon's diagrams, based on small Golden Section rectangles, represent his ongoing efforts to arrive at a formal canon of proportion in the *Diadoumenos*. Seen now, they are a crucial waystation towards a final result. Throughout these diagrams the essential element that is missing is the overall width of the canon. We have the height in Gordon's canon but not the width. Note the absence of width in the linear breakdown of the overall height dimension in accordance with the body's anatomy, shown at the left and right of Gordon's diagram of the canon. My overlays now place the width on his original canon. Note that this involves no change whatsoever in Gordon's measuring points.

The length of the largest dimension that appears in the canon - 3ϵ (3η) - is one-half the height of the body. The strangeness of this division of the body into halves bears repeating; from the time of Vitruvius in the first century BCE, as seen in Leonardo's reconstruction of Vitruvian proportions, and thereafter to the present, Western art has measured the body at its full length and divided it arithmetically into modules — heads. What could be more different than a statue divided geometrically into two equal halves at the pubic symphysis and, as I would find in 2018, with its proportions, large and small, organized by means of squares and Golden Section rectangles?



There are no such divisions of the body in European art that I know of — not Piero or Poussin or anyone else who may have used the Golden Section, the root 2 rectangle or some other geometric ratio in their proportions. Piero, a master of perspective, inserts and integrates linear perspective into the abstract geometric

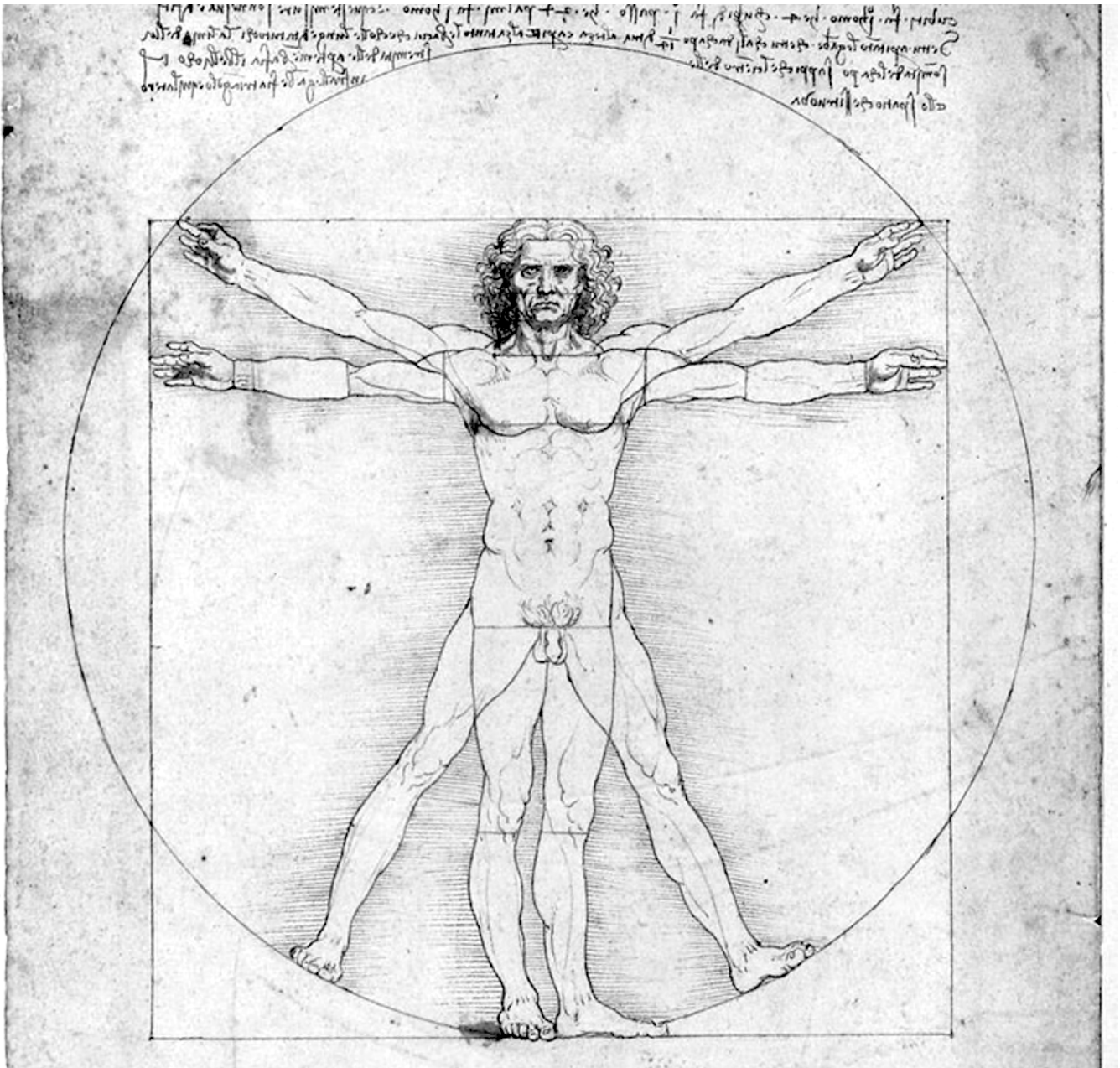
schema of his compositions. As I know from measuring, he used geometric ratios in his work, and to great purpose, but not to this end; like the other artists, he was not concerned with representing the actual, objective proportions of the body's parts, one to another, or with the creation of an anatomically functional figure. We shall presently return to the underlying reason for this. As for antiquity, there is little or nothing remaining on this subject, except a report of half of a statue being made on one Greek island and then transported to another island where it joined and perfectly matched its other half.

I emphasize the division of the body into halves not simply to indicate how differently a Greek artist would approach proportioning the body compared with us, but further, to suggest how differently artists may approach the body in any culture other than our own. How do artists proportion bodies in China, India, Africa? How do they conceive and use proportion to emphasize and communicate their values? The division of the overall length of the body into halves as opposed to starting with the overall length divided arithmetically into modules (heads) may seem unimportant to a lay person but it points to the crucial difference in how the Greek artist conceived proportion and carried it out in the figure, with all the attendant expressive qualities that proportions bring to that figure. The variety and comparative chaos in proportions throughout Renaissance and post-Renaissance figures, nude or clothed, is grounded in the fact of their linear, arithmetic divisions of the body, based on the overall length and divided into heads (the canon of Vitruvius). What happens when the figure moves? From a single station point the objective proportions disappear when the figure turns or bends. This is the price of a single station point and Brunelleschian perspective. Determining proportions by linear, arithmetic subdivisions, is as different as day from night when compared with the geometric squares and rectangles that are being postulated and described here.

Behind the technical means which any artist uses there is a worldview: Greece is not Italy. Kenneth Clark's distinction between 'geometrical' and 'arithmetical' is on target. It is important to be aware that the Greeks had no numerology as we understand it. The decimal system and algebra were unknown to them. There is indeed a concept of number and its use that appears in these diagrams as halves and units of threes, such as 3γ , 3δ , 3ϵ , 3ζ , 3η . The numbers are significant insofar

as they harmonically relate units of the Golden Section progression to other Golden Section measurements in the statue, as in this case, by a factor of three. The simultaneous appearance of multiples and common fractions along with Golden Section ratios in the proportion of the body is a visible manifestation of the inherent properties of the Golden Section.

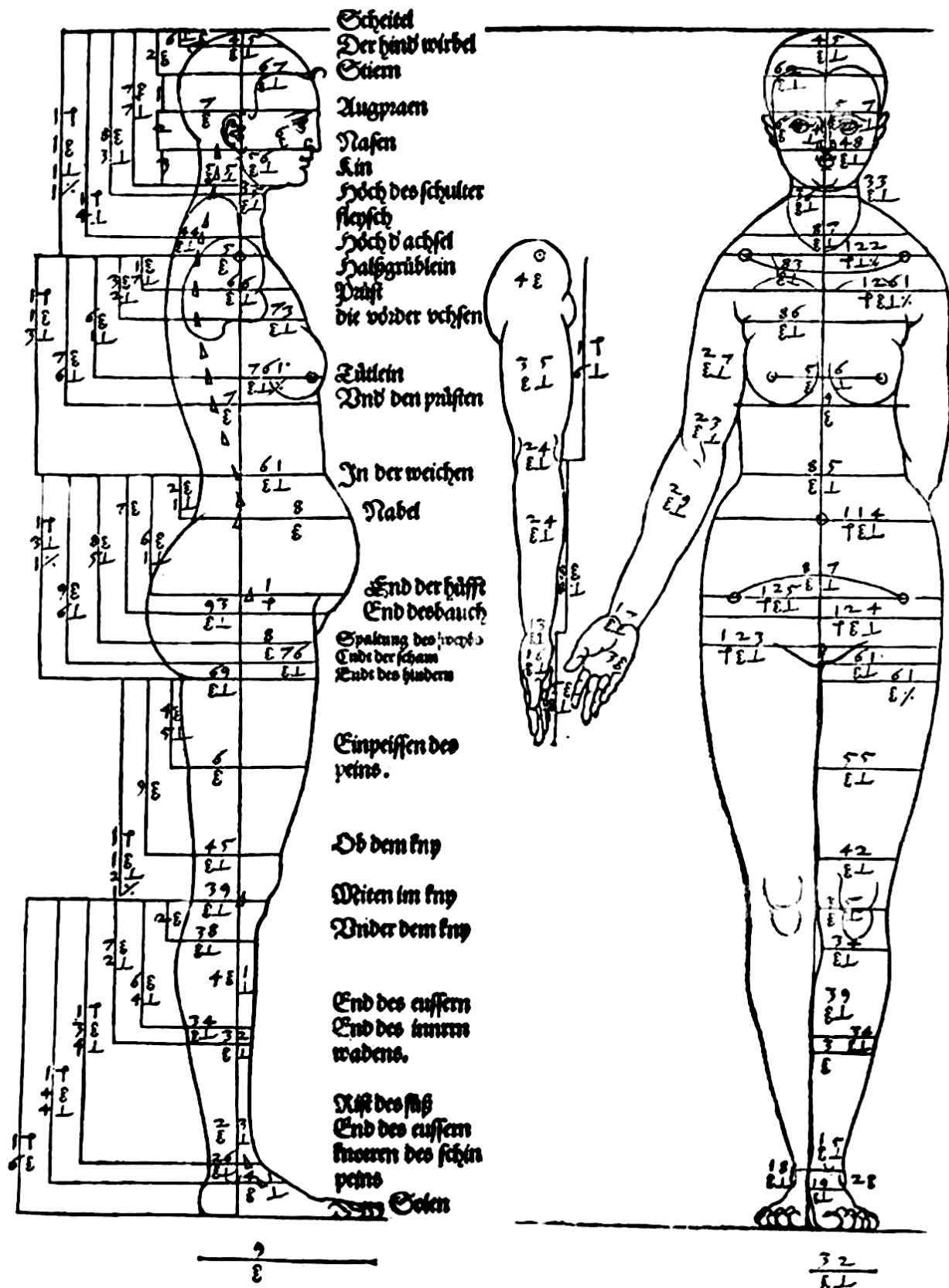
The Greek sculptor utilizes common fractions and units of the same size throughout the figure to achieve geometric harmonies that also play out in



VITRUVIAN MAN

Leonardo da Vinci, c. 1490

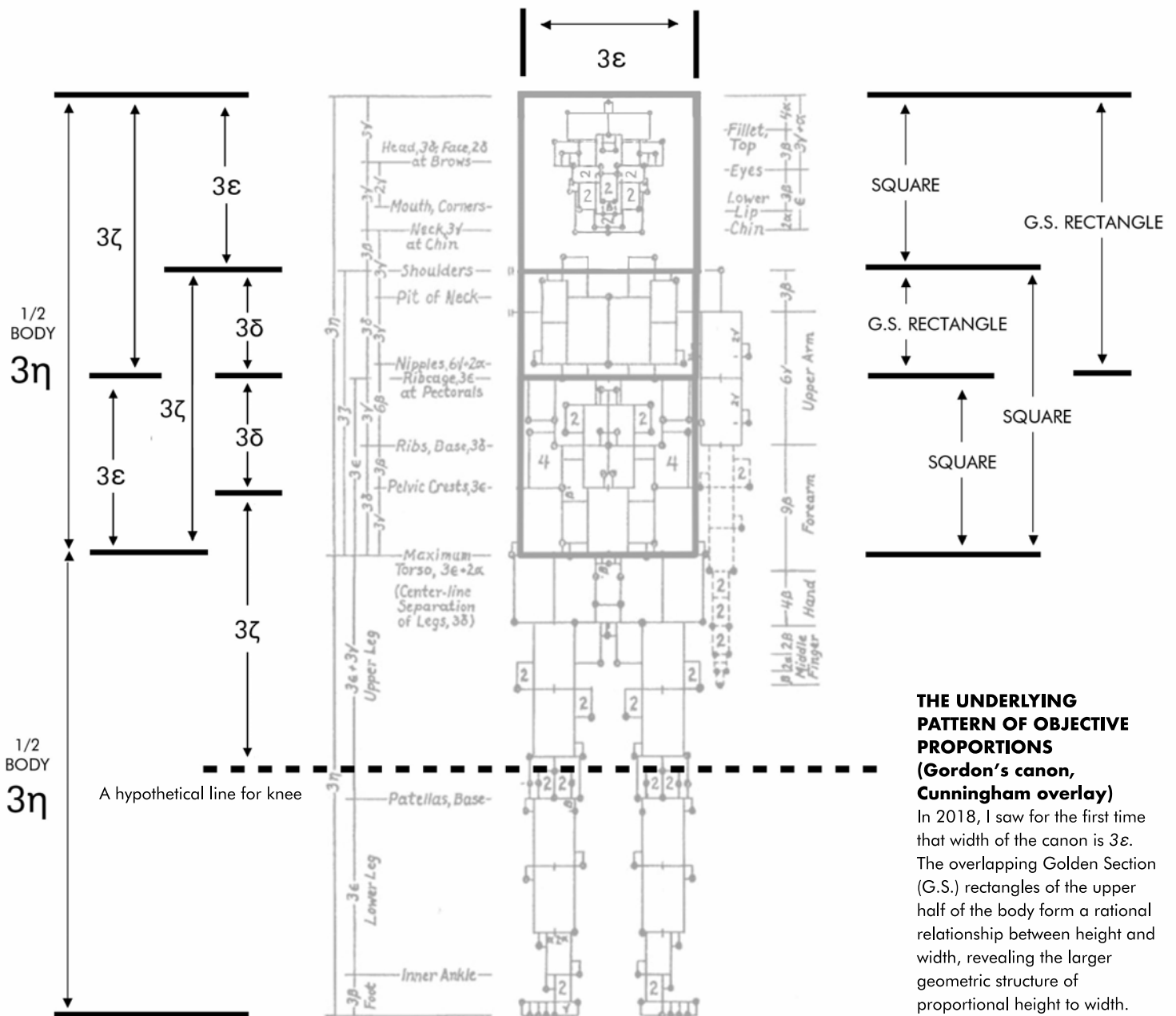
7½ heads high. Leonardo is said to have reproduced Vitruvius's proportions exactly, with two minor exceptions.



ALBRECHT DÜRER

1528

Arithmetic height to width measurements of the body's proportions



arithmetic harmonies. This brings numerical value to a geometric dimension of interconnectedness and harmonic repetition. It appears in a way that is foreign to Western concepts of number as they are expressed in our arts, and foreign to the way European and American artists have proportioned the human figure. No doubt the coexistence of both arithmetic and geometric harmonies in Greek sculpture, as seen here in the Diadoumenos, explains in part why the Polykleitan canon has not been rediscovered.

Seen on the left of this diagram, the 3 eta (3η) height dimension of the upper half of the body is subdivided into Golden Section ratios as follows, building upwards. (Displayed in red.)

- Measuring from the bottom line, which is the pubic symphysis, up to the pectorals, 3 epsilon (3ϵ)
- Then from the pectorals up to the top of the head, 3 zeta (3ζ)

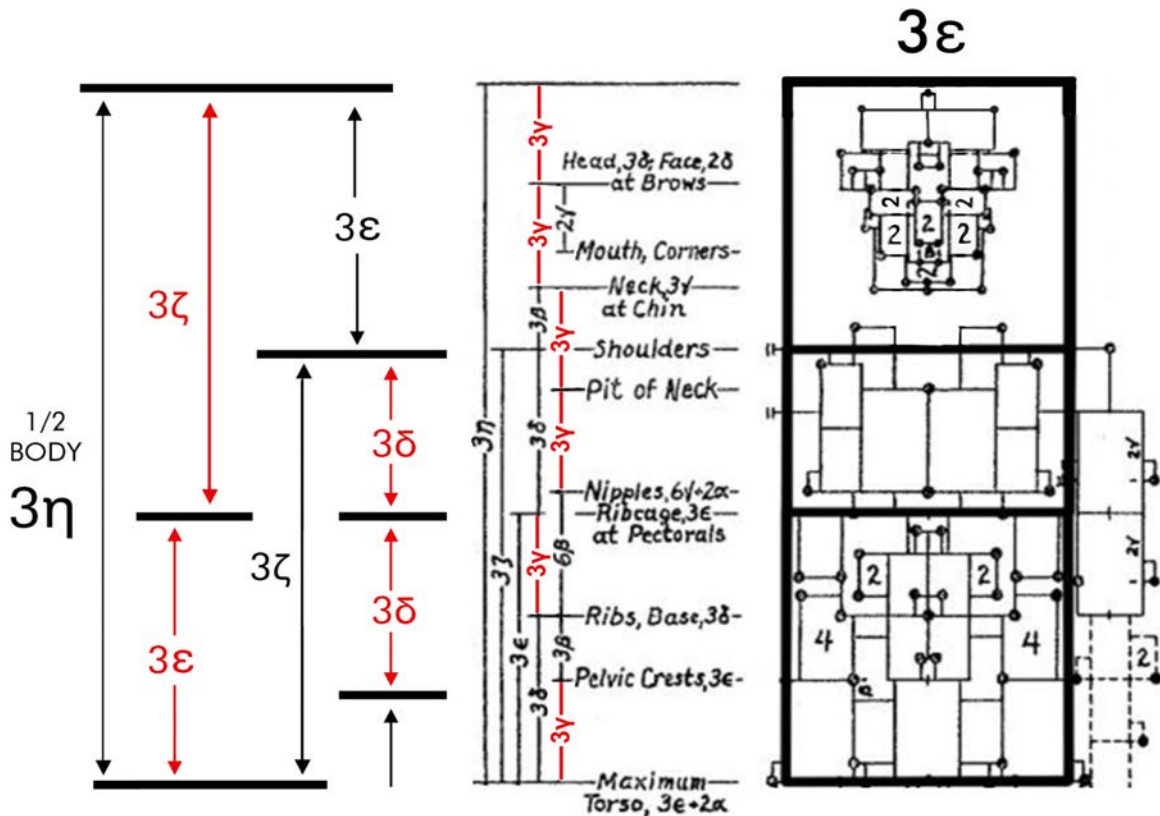
Smaller measurements in the middle of this section are:

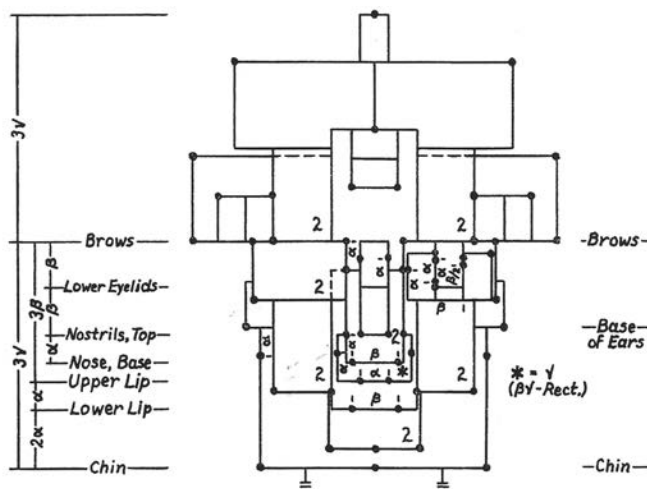
- From the pelvic crests, up to the pectorals, 3 delta (3δ)
- From the pectorals up to the shoulders, also 3 delta (3δ)

Also in red are smaller tiers of 3 gamma (3γ) heights — harmonically repetitious, not consecutive.

- From the pubic symphysis up to the pelvic crests
- From the base of the ribs up to the pectorals
- Then consecutively, from the level of the pectorals up to the pit of the neck
- Up to the level of the chin, to the line of the brows, and from the brows to the top of the head.

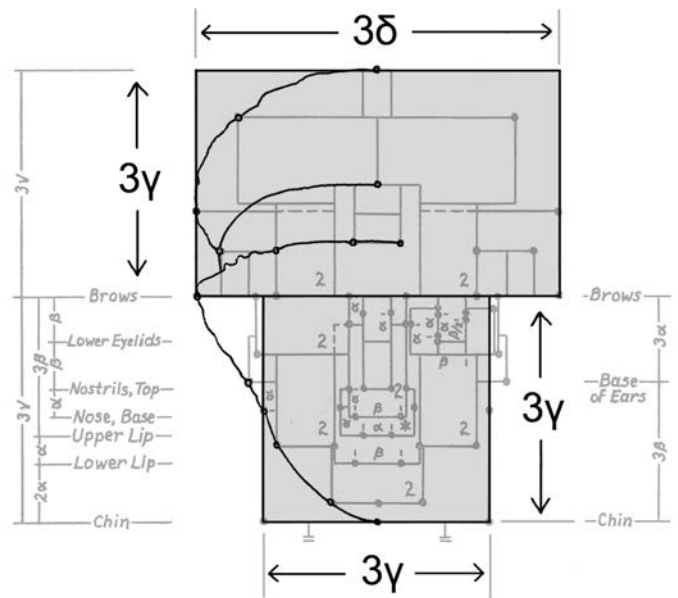
Now imagine all of these harmonic proportions carried into the actual statue, a subject not taken up in these diagrams, but which presently we will consider.





GORDON MEASUREMENT

The original measurements of the Diadoumenos head. The Golden Section progression is the same as in the other diagram.



GORDON MEASUREMENT WITH CUNNINGHAM OVERLAY

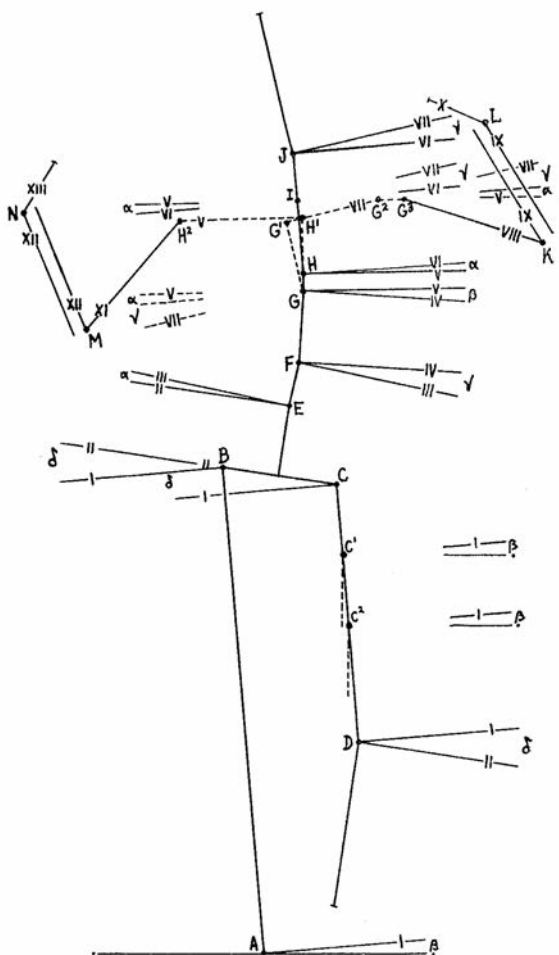
Duplicating Gordon's proportions in diagram at left. Cunningham has added the 3γ and 3δ Golden Section rectangle, which at brow level divides the large dimensions of the upper head. The face and features are shown in the 3γ by 3γ square beneath the brow.

The basic concepts expressed in Gordon's diagrams are sound. One can build on them. The problem is the diagrams are complex, confusing, and underdeveloped. There is too much information crammed into each diagram. They cannot be readily understood. Most significantly, because these original diagrams lack a governing width for the canon a sculptor could not work from them. Without the width harmonically related to the length, the underlying simplicity of the large units — torso, limbs, and head — which I felt was present when I first saw the *Doryphoros*, does not exist.

The missing width of Gordon's canon — 3ϵ — and the large proportional divisions of the body now are added to the diagrams in bold, and are based on and coordinated with the measurement points that Gordon had determined. I saw that all the lesser dimensions of the upper half of the body were contained and related to one another within two overlapping Golden Section rectangles. The multiplicity of small rectangles in Gordon's diagram of the head of the *Diadoumenos* could now be seen in relationship to two large, governing proportions — a Golden Section rectangle for the upper half of the head, placed above a square for the lower half — the face, from the line of brow to the chin (Gordon Measurement, on previous page). All such "discoveries" of the large

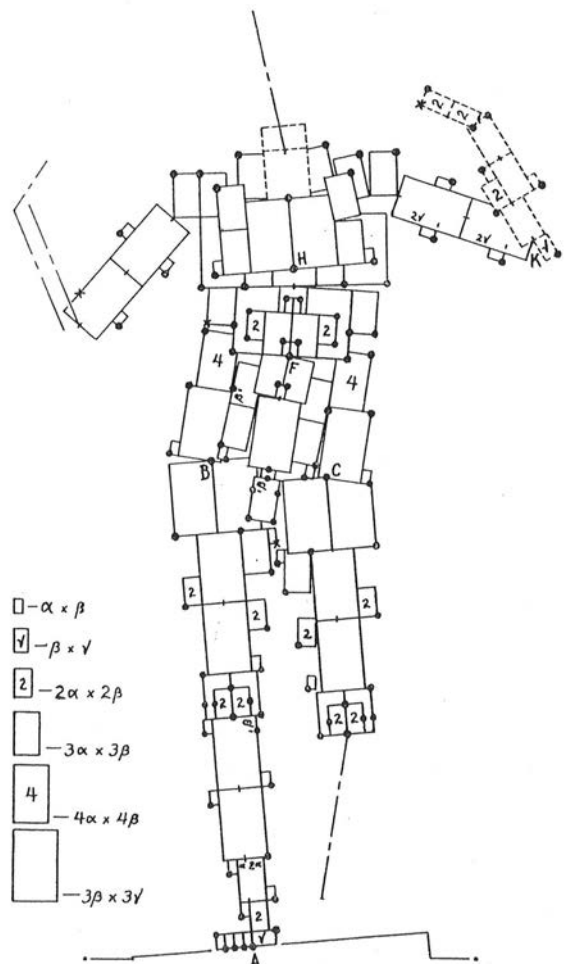
dimensions had been waiting within Gordon's measurements. Again, the whole idea of a geometric canon ordered in this way challenges the way the human figure has been approached in European culture. In the details as well as the whole I believe it is entirely unfamiliar to us as a way of proportioning the body.

As we have seen, in Gordon's original diagram of the canon, the anatomical parts of the body and their Golden Section proportions are expressed in linear form (height only) to the left and right of the figure. Aside from the small Golden Section rectangles, there are no indications of width or of the larger relationships of height to width. This was our conditioned, linear thinking expressing itself in the midst of



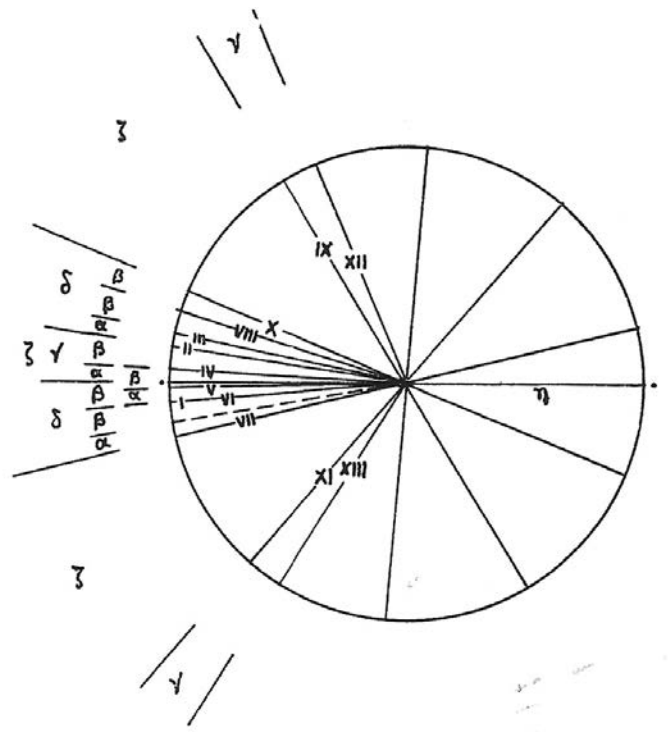
POINTS AND ANGLES OF ANIMATION, FRONTAL ELEVATION

The points of animation are the anatomical points of movement in the body — knee, elbow, hip, spine, etc. — labeled A, B, C, etc. The angles of animation I-XIII are measured from the points of animation with a uniform η baseline.



ANIMATION DIAGRAM, FRONTAL ELEVATION

The Golden Section small rectangles with their measuring points have been transferred from the canon to the new baselines, to position the measuring points the sculptor uses to proportion his statue.



ANGLES OF ANIMATION DRAWN TO A COMMON CENTER

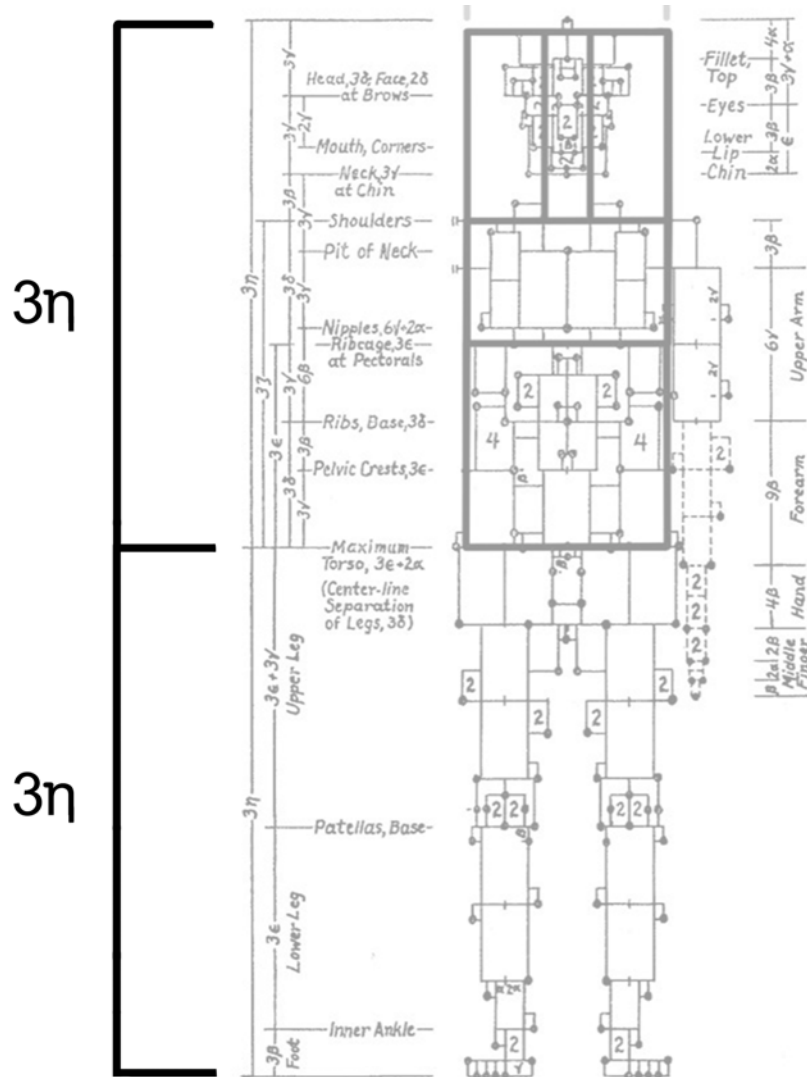
The sum of all the animation angles seen in the first animation diagram equals two segments of the hexagon.

These objective dimensions and relationships are precisely what is being expressed in Gordon's diagram of a frontal canon, with the height and width of the body parts stacked one on top of the other in the robot-like, rigidly frontal, upright figure of an ideal human body, waiting to be animated and carried out in an actual sculpture. Even though incomplete and overly complex as they are in their present form, compare these diagrams with Leonardo's notebook studies of human proportion or with Dürer's studies of the proportions of the figure, for a graphic understanding of the two different mindsets. There is nothing comparable in the proportional schemas of these Renaissance masters.

ANIMATION

With a canon determined, the Greek sculptor is faced with the question of how to animate its objective proportions. Gordon's Animation Diagrams explain the way in which this would be accomplished on a frontal plane without altering the proportions. Gordon's Points and Angles of Animation Diagram, shows the points of animation positioned, logically, at the body's joints. To determine the angle of displacement, Gordon discovered the uniform length of a baseline onto which the body's parts could then be moved. This baseline is *eta* (η) in length and it is uniformly used throughout the body to animate the pose. The baselines are extended from their points of animation. Each animation angle is measured by a perpendicular constructed at an *eta* (η) distance from the point of animation. These perpendiculars are implied and not shown graphically in the diagram. At right angles to each baseline, they are used to measure the cord of an arc taken from a segment of a circle with an *eta* (η) radius. They determine the measure of the angles (α , β , γ , etc.). We know that the Greeks had no circular degrees and minutes; they would have measured angles by means of the cords of arcs, as described here. Gordon's Animation Diagram, Frontal Elevation, shows the various parts of the body, now off-centered to conform to the pose on the frontal plane.

In arriving at the pose, the initial displacement from the rigidly frontal canon occurs in the centerline of the standing leg, labeled A-B. This initial angle, taken on the new baseline of an *eta* (η) length, measures *beta* (β). It displaces the vertical leg from the horizontal base of the statue. The off-centering of this weight-bearing leg begins what will become, in space, the Polykleitan "S" curve. It is shown here determined on the frontal plane, and it begins an opposition of tension and relaxation in the parts of the body that will be developed in three dimensions. The proportions of the parts of the body, having been determined in the rigidly frontal canon, are placed on a plane, a profile median plane, which can then be turned away from the frontal plane in accordance with that part of the body's location in the pose. In its turnings in space from the frontal plane, the "S" curve would give the sculpture a naturalness and ease that was as famous in Greece as the canon itself.



TWO HALVES OF THE CANON

From the pubic symphysis to the top of the head
(or to the bottom of the feet) becomes the XY line

The Polykleitan canon represents a formal advance in Greek sculpture. Compare it with archaic Kouroi or the sculptures of the Transitional Period. The shift of weight to the standing leg and the consequent displacements of the parts of the body were in fact a gradual development away from the rigidly frontal standing pose, a development that took place and accelerated throughout Greece during the half century and more preceding Polykleitos.

If such an accounting for a pose diagramed on a frontal plane seems problematic, one must reckon with Gordon's diagram, Animation Angles Drawn to a Common Center, in which the total of all the angles of animation equals two

segments of a hexagon. As Gordon pointed out in the text of the original article, the final angle that completes the two segments of a hexagon confirms the angle used in his diagram of the Metropolitan Museum's reconstruction of the *Diadoumenos*'s missing hand. I cannot believe it accidental that the sum of the angles is two segments of a hexagon. It is consistent with what we know of Polykleitos. Kenneth Clark quotes from an ancient source: "... as Polykleitos told his contemporaries, from the toes to the last hair in the head every line was calculated."

As we have seen, Gordon would find the largest dimension to be used in the body of the *Diadoumenos* to be one-half the height of the canon, a length which corresponds anatomically to the division of the body at the pubic symphysis. This dimension is labeled 3 *eta* (3η). Let this line, which divides the body in half from the pubic symphysis to the top of the head or to the bottom of the feet, be the "XY" line shown in Golden Section Diagram #1. As we know, in European art from the time of Vitruvius, the proportions of the body have been based on the overall height, divided arithmetically into heads. In Greek sculpture one half the height of the body becomes the line from which are derived all the smaller units, with *alpha* (α) and *beta* (β) being the two smallest, most frequently repeated dimensions. Gordon and I had no such given measurement with which to determine the progression. Gordon arrived at the "XY" line empirically after finally determining the vitally important, small alpha/beta units of the progression.

How to arrive at *alpha* (α), the most frequently repeated small dimension, whether a Greek making a statue or an American measuring a photograph? For the latter, there are no simple answers. For the Greek, there are several purely geometric ways in which a given length, such as line "XY", may be divided into the Golden Section. Working backward (large to small) from this given length and having initially divided the line into two Golden Section segments, the sculptor would divide the longer segment into Golden Section ratios. The sculptor would continue the process until arriving at the smallest, most frequently repeated dimension needed for their design — *alpha* (α). If this process for creating a Golden Section geometric progression from a given length sounds improbable or questionable, as a painter I have used it many times. Note that when arrived at geometrically, as the Greeks would have done, no numerology is needed, meaning no arithmetic use of .618033....

And so, for the practicing sculptor whether Greek or contemporary, one also would not begin with an *alpha* (α) — one would arrive at it. The simplest reason for this is that whether the sculpture is free-standing or in relief, the sculptor has a given space within which to work. Before commencing the work, the sculptor must factor in the dimensions of the given space in order to arrive at line “XY”. This given space will determine the height, (or length, if reclining), of the sculpted figure. The “XY” line will then be determined.

The sculptor would make a progression, as outlined here, and proceed to proportion the figure according to the canon.

The overall height of the figure has been the basis for proportioning the human body in Western art since the time of Vitruvius (1st century BCE). My assumption is that the Greek sculptors found that one-half the figure provides a workable progression that describes the smaller dimensions of the body — fingers, toes, knees, facial features, etc.— without a need for the unused larger dimensions. These smaller dimensions are the key proportional determinants that a sculptor would need. There is also a possible religious reason for the division of the body into halves, which presently we will consider. My further

assumption, supported by Gisela Richter, former curator of Greek art at the Metropolitan Museum, is that Polykleitos did not invent such a schema as outlined here but refined what had been developed earlier in the Archaic period — a refinement that involved anatomy, movement and attention to surface, as well as proportion.



GISELA RICHTER

Former curator of Greek art,
Metropolitan Museum of Art, New York
(Date unknown)

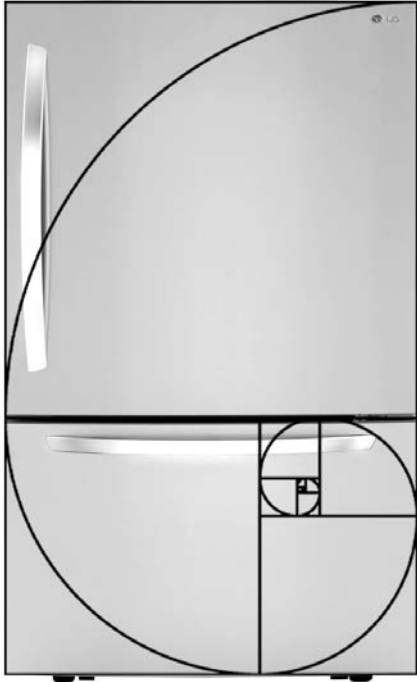
THE MEANING OF 3 EPSILON

Gordon saw the logic of a rectangle in relating height to width; he did not, however, see or realize the potential within a Golden Section rectangle. Nor did I, until I revisited the diagrams published in the *Art Quarterly* (Summer 1962) in 2018. I would discover the width of the canon, 3 epsilon — present in the diagrams but unseen until then. This in turn would expose the governing large harmonies in the Diadoumenos expressed in squares and Golden Section rectangles — harmonies hidden though present in Gordon's diagrams.

As soon as the 3 epsilon (3ϵ) width of the canon was determined and using Gordon's measurements, I found that the anatomical parts of the entire upper half of the Diadoumenos' body were proportioned in relation to two large, overlapping Golden Section rectangles. One rectangle measures from the top of the head to the line of the pectorals; the other encompasses the area from the pubic symphysis to the line of the shoulders. The overlap will be, by definition, a Golden Section rectangle, one that defines the pectoral area of the chest, from the line of the pectorals to the line of the shoulders. As we have seen, each Golden Section rectangle may be further divided into a square and a smaller Golden Section rectangle. The upper square proportions the head and neck area from the top of the head to the line of the shoulders. The lower square defines the area between the line of the pubic symphysis to the line of the pectorals. The smaller harmonics which we have described earlier, relate to each other within these large proportions, as in the diagram of the head.

With or without mathematics, this is the way artists work and think — the large notes, with the smaller parts in relation to them. This is why the absence of the large dimensions in the original diagrams and in our thinking, had been a continuing thorn in my side.

The excitement I felt on finding 3 *epsilon* (3ϵ) and the two Golden Section rectangles describing the upper half of the body confirmed a fundamental fact in all the arts; at the heart of every great work of art — painting, sculpture, architecture, music, dance — there is simplicity. I have found as I worked with this material that the simpler the solution, the closer the approach to the truth. It was pure joy for me to see these two overlapping Golden Section rectangles, and then to see them break



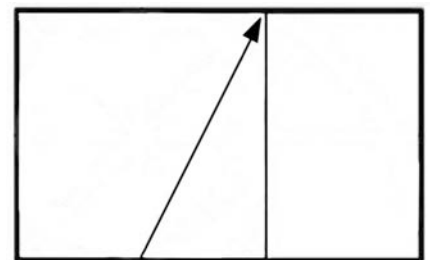
GOLDEN SECTION
Ratio of refrigerator to freezer,
with the Fibonacci Series overlaid

harmonies, its repose, even in movement, and its beauty. And so, it is appropriate to introduce here a further note of skepticism. As I have remarked, you can easily put the Golden Section onto your refrigerator door by taking the height of the refrigerator and dividing it so that the short segment is to the long as the long is to the sum of two. Then you may proportion the plane, locate the freezer's placement and also make any arbitrary, decorative design that you wish. I use this process when I take the length of the base of a canvas and make a Golden Section progression which I will use throughout a painting.

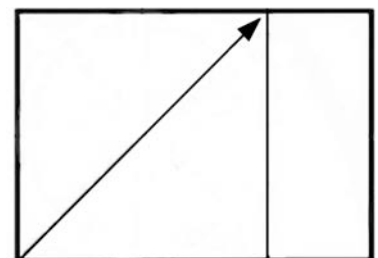
How do I know Gordon hasn't turned a photograph of the Metropolitan Museum's *Diadoumenos* into a design for a refrigerator door?

I don't, but I would not have found these two large overlapping Golden Section rectangles without Gordon's underlying measurements. That encourages me to accept the accuracy of his measurements, incomplete as they may be, (and as they appear to be in the lower half of the body – not sufficiently descriptive of a large, simple order).

I am also aware of the work of others such as Richard Tobin, who in 1975 described a canon for the Naples Doryphoros derived from a rectangle created by extending the diagonal of a square. This is a root 2 rectangle ($\sqrt{2}$). While it does not have the unique connection between height and width of the Golden Section rectangle, what I like about Tobin's work is that his approach to the canon is geometric. He is using the tools of the Greek mindset, and he made a geometric measuring stick. The Golden Section and the root 2 rectangles are cousins in that they each contain a geometric harmony, but those harmonies are incommensurate with one another.



GOLDEN SECTION RECTANGLE



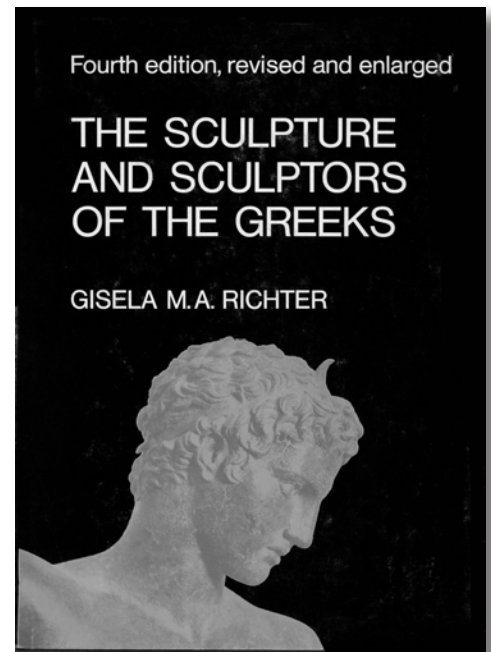
ROOT 2 RECTANGLE

THE THIRD DIMENSION: PROFILE MEDIAN PLANES

A further problem with the diagrams is that there is no indication whatsoever as to how to go from the flat, frontal plane of the canon into the third dimension, but the answer is suggested by Gordon in the article's text. He writes that the measurement points determined in the canon are placed on what we have called a profile median plane, a plane passing through each part of the body on which all dimensions appear in their true objective condition, without distortions arising from foreshortening.

One may visualize in the mind's eye such a plane, complete with its measurement points placed in each part of the body as determined in the canon, conceived as being seen by the sculptor (and you, the viewer) head on and at right angles to your line of sight. Each of these planes faces front, as in the canon; each plane may then be tipped and rotated in space in such a way that every part of the body is moved from the frontal plane as needed, to take its position in the pose. As long as each individual part of the body is conceived and sculpted as if seen "head on", there will be no built-in perspective distortion caused by the foreshortening of forms viewed from a single station point. Each part of the body will appear with its true proportions, in the sculpture itself. This means there must be many points from which to view the body — multiple station points. Unlike the Renaissance, the body is not located in space by means of a single, principal station point. Here there is no single, governing view point that tells the viewer where to stand and how to look. No matter where the viewer moves, the body's objective proportions will be seen as though conceived and viewed from head on.

Gisela Richter's 1929 book, *The Sculpture and Sculptors of the Greeks*, has been, and continues in later editions, to be an indispensable resource. In it Richter describes, without reference to mathematics, the visual effect of the profile median plane and multiple station points: "Each part [of the body] appears to point at the



spectator as he looks at it, the adjoining portions retreating to the background; in other words, the sculptor has no longer restricted himself to a few principal views of the figure but is able to combine a large number into a unified whole.” As well as being a perfect description of the effect of multiple station points, this also suggests how, as many have noted, fragments of Greek sculpture may stand on their own

independently, and at the same time, in their proportions suggest the missing whole.

Not just in Polykleitos, but in Greek sculpture in general, the parts of the body, sculpted in their objective proportions, will appear visually to change as the viewer moves but each part of the body always will retain its objective proportions as determined by the sculptor on its profile median plane. Because this will allow each part of the body to function anatomically as it does in life, the sculpted figure is, suggestively, able to step out of the pose and no matter where one stands to look at it, move about as the body does in life. This capacity to move gives the figure the expressive power and life I felt on first viewing the *Doryphoros*.

Returning to the question of how the sculptor transposes the flat, frontal canon into a three-dimensional sculpture, I see no problem in



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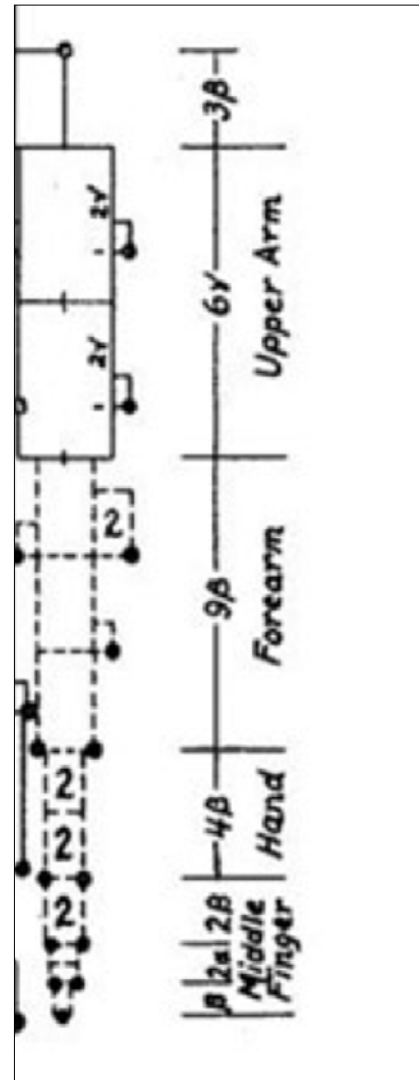
Top, former P.S. 9, near Grand Army Plaza.
NBS worked in the five-story annex, bottom.

accomplishing this. I have worked all my life depicting three-dimensional form as a painter and although I am not a sculptor, I have worked with sculptors of the human body, namely my life-long friend and colleague, Barney Hodes, and his students. We worked together on the life-size nude, the centerpiece of the New

Brooklyn School of Life Drawing, Painting & Sculpture which Hodes and I co-founded. There is no problem that I can see in taking Gordon's, or anyone's, dimensions as expressed here in a canon and placing them in a sculpture. A sculptor today would do as Polykleitos no doubt did, and make a *modello*. He would first determine the pose in drawings and small sculpted studies and then transfer the body's objective proportions as they would appear on a profile median plane, into their proper position in the pose. The result is a smaller version of the final sculpture with its proportions in place.

For the Greek sculptor, the *modello* would be a Golden Section fraction of the predetermined geometric height of his statue. The sculptor would make an armature of wood or metal, or would it be a stiff wire that can be bent to determine the varying thrusts of the body, arms and legs? Did the Greeks have wire? That kind of question does not matter here. What matters is that the work was done and it can be done again. Then as now, problems such as creating a pose and determining its proportions, would be resolved in the *modello*. As we would do today, the sculptor no doubt first made drawings like those on a Greek vase, and also small sculpted studies in advance of the *modello* to work out various aspects of the pose.

As an illustration, consider a representation of a body part such as the lower arm: the Greek sculptor or his assistants would transfer from the canon the geometrically proportioned width dimensions of anatomical landmarks such as the bony condyles on either side of the elbow that mark the joint between the upper and lower arm and the width at the wrist where the radius and ulna meet the carpus of the hand. The objective proportions are retained on a profile median plane. Likewise, they would have the geometrically proportioned length dimension



**PROPORTION OF THE ARM
EXPRESSED IN LENGTH**

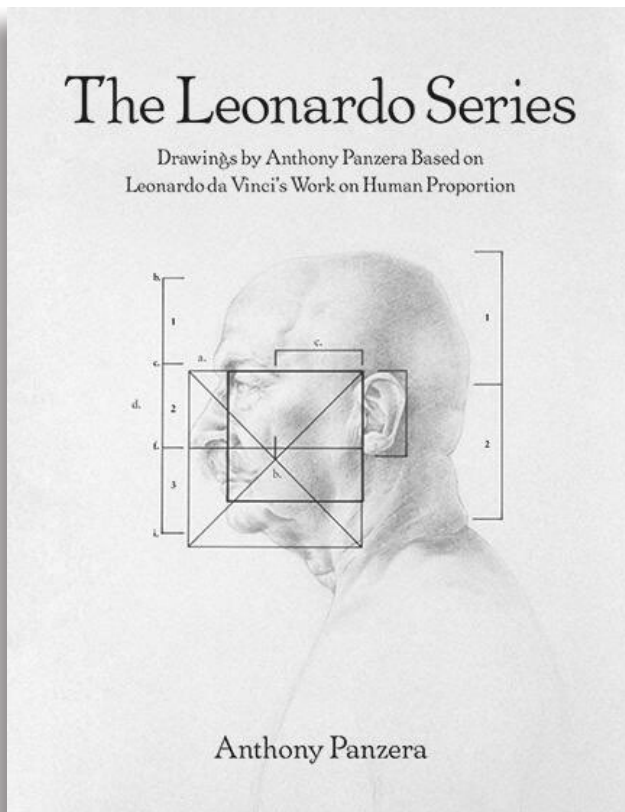
of the ulna, which describes the length of the lower arm. In this way, no matter what the pose, the width and length measurement points as determined in the canon, would be expressed in the three-dimensional construction of the arm, retaining their objective relationships no matter what position the arm is in. In the decades before Polykleitos, sculptors were well on their way to mastering the anatomy of the arm so as to model with understanding and grace the rhythms of the forms, the flexor and extensor muscles, tendons, bone and flesh — the stresses, strains and relaxations — as the arm would appear in any given pose. The same would be done for the hand, the upper arm and all the rest of the body, with every part sculpted in Golden Section harmonic relationship to each other.

With the entire *modello* completed in clay, wax, or whatever malleable substance, the proportions seen in Gordon's canon (or anyone's canon) would appear without distortion in each part of the body. The proportions of each part will be seen in relation to every other part and to the whole and the abstract canon will have been transposed into the sculpture. With the overall height determined, a full-size statue in clay would then be made with the proportions transferred without alteration. This figure would then be cast, the bronze poured, the cast removed, and there it stands, a proportioned statue in which "every line is calculated." It should be noted that the Greek sculptors from the 5th century BCE on, would usually create such statues in bronze. Copies of them were then made in marble. Without the mathematics, Barney Hodes and our students in the New Brooklyn School would follow a comparable procedure, in making a sculpture of the figure with multiple station points, capable of movement.

In Greek sculpture, never far from us is the fact that the Golden Section is not just a line with a beginning and an end, it is a section of a line that can either be segmented or expanded into infinity. This is the magic: *alpha* is present in each of the larger units of the progression. Something is always happening; a line or a shape is always suggesting possibilities. Any given line can be segmented, expanded or contracted into infinity. One does not just start at a beginning and arrive at an end, as we do in our culture, because wherever you "end" there is a beginning and your "beginning" is an end for some other beginning. The microcosm is within the macrocosm — *alpha* always is within the larger units of the progression, and so if you have an end, you can find the beginning. It is a strange world in which

beginning, and end, do not mean precisely the same as they do for us; there are no static starts or static termini with arithmetically determined modules in-between.

As noted, when working with the *Diadoumenos* with its twists and turns away from the frontal plane, the overall height of the canon cannot be measured from a photograph. It must be reconstructed. That is not as difficult as it may seem because any miscalculation in the dimension of *alpha* will show up immediately and progressively in all the larger dimensions of the progression. In this respect, the Golden Section is self-correcting.



Having worked with this material, I know that Gordon arrived at the *alpha* seen in these diagrams not by beginning with a developed geometric method such as I have been describing, but through a combination of empirical measurements made on the photograph and the internal logic of the Golden Section. In any event, he told me that only when he had completed the diagrams, did he then go to the Metropolitan Museum and measure its marble copy of the *Diadoumenos*. He had found that *alpha*, the most frequently repeated small dimension in the canon, was present in the width of the index finger and that it measured 0.6875 inches. His numeric scale is listed in the article. He also made

several measurements in inches and found small discrepancies between predicted and actual dimensions.

One might expect small discrepancies to occur in the pointing process, which was the method used to reproduce proportion in marble copies such as the Metropolitan's *Diadoumenos*. It should be noted that Gordon and I found occasional use for a next smaller dimension in the progression, which we labeled ".618 alpha."

I have suggested comparing proportions in our diagrams and photos with drawings by Leonardo and Dürer. Also, one can see the differences between Greek proportion and the Renaissance graphically illustrated by comparing our diagrams

and photos with Anthony Panzera's beautiful drawings of the male nude based on the proportions in Leonardo's notebooks and published as *The Leonardo Series*.

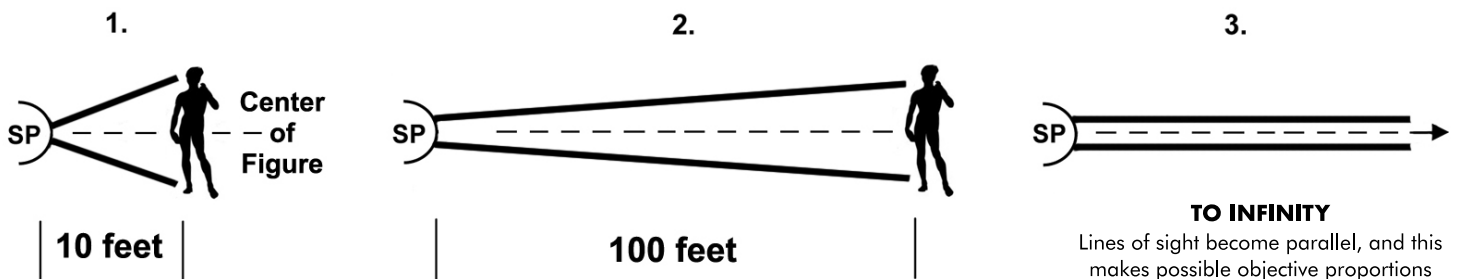
Panzera has brought together and for the first time, illustrated all of Leonardo's notebook studies for the proportions of the human figure, completing what Leonardo himself had hoped but failed to do.

One can think about, ponder and sense the harmonics in Greek sculpture. One responds to them because one can see these harmonics behind the physical forms of the body and experience their relationships and repetitions in height and width and linear lengths, expressed in rectangles, squares, and quadrilaterals. One literally can see the geometry within the body as it underlies Greek sculpture. It is an extraordinary and exciting experience.

OBJECTIVE PROPORTIONS AND MULTIPLE STATION POINTS

An aspect of Greek sculpture that greatly concerns me is the fact that the sculptors had no perspective in our sense. They did not possess what figurative artists since the Renaissance have depended on. For the Greeks, this meant that unlike Brunelleschian perspective, there was no dominant single station point entrenched in a system of orthogonals and vanishing points. The Greeks could employ multiple station points. Whether they understood them specifically as station points is certainly debatable. If one thinks in terms of a profile median plane on which each part of the body is seen in its objective proportions, would a concept of multiple station points be relevant or necessary? We can only hypothesize on the basis of what they did.

The fact that the Greeks could create an anatomically functioning figure with objective proportions, which for us today, requires multiple station points, does not mean that they thought in that way. Perhaps they conceived in terms better described as flat planes on which points are to be geometrically related one to another and placed in space. How did they view an arm, a hand, a head, or a foot? Did they see a human being, a statue, or a temple by itself alone? Or did they not see them, as made clear by Vincent Scully in *The Earth, the Temple, and the Gods*, as being harmonically connected with the surrounding land? Perhaps they saw the individual object as a part of the entire cosmos, organically connected and in cosmic harmony. Look at their architecture, their theatre, their science, and their philosophy — the microcosm within the macrocosm. Perhaps they saw everything not as static, independent units, but as being related harmonically to every other objective entity and to the whole. Would such an assumption or cast of mind



STATION POINTS

When the object is an "infinite" distance from the station point, all lines of sight will be parallel. There will be no perspective distortion.



DRAUGHTSMAN MAKING A PERSPECTIVE OF A RECLINING WOMAN

Albrecht Dürer, c. 1600
The Metropolitan Museum of Art
Single station point. Note the grid.

account in part for the way in which Thucydides conceived history and how his conception differs from ours? How do we understand their mindset?

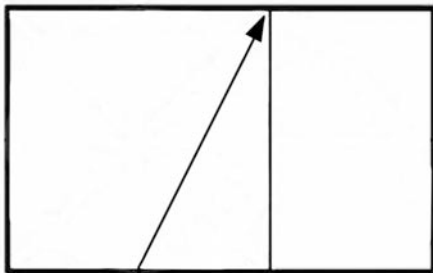
From my own experience as a painter, I know that I think and perceive in the linear arithmetic mode of our time. I can go outside of this framework only with effort. My ruler is divided into inches or millimeters, not into the geometric progression postulated here for the Greeks. This is the linear way of seeing and organizing for which Brunelleschian perspective is the embodiment, with its single station point, horizon line, vanishing points, and orthogonals.

I have used both the Golden Section and root 2 rectangles, not in painting the nude or clothed human figure, for I do not want to impose an idealized grid on the body, but in still life and landscape when the subject I am looking at suggests such a harmonic. Nevertheless, I use these tools primarily in a linear way. At the outset of a painting, I have at times employed them with the Golden Section or root 2 section in such a manner as to design the entire canvas in large, simple patterns — a harmonic geometric expression of the relation of height to width in which the elements of the composition will relate to one another. When I carry out the work, I am not comfortable with a comprehensive geometric construction, such as we have been describing in the *Diadoumenos*, expressed in terms of squares and Golden Section rectangles. Instead, I will use the points in the progression in a linear way to describe and organize harmonically the directional lines in objects such as the tools in a still life, or distant hills, the spacing of trees, and the relationship of foreground

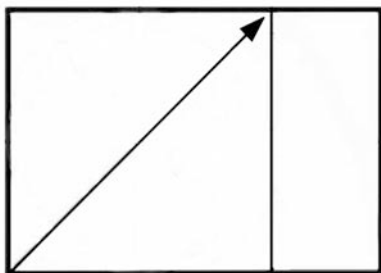
hills to middle ground buildings and the background hills of the Berkshires that I am looking at.

I see the third dimension in terms of the second dimension because I work on a flat surface. As Edwin Dickinson would say, "... one learns to see as a painter." And so I abstract the harmonies and locate them on the flat surface of the canvas. The harmonic employed, whether Golden Section or root 2, then will be present in the painting, but in this way. In my experience, the visual presence of these decisions is so unobtrusively powerful that an unknowing viewer will nevertheless respond to them instinctively.

My guess is that Piero, Poussin, or anyone working in the European tradition and using a geometric progression, would have done much the same. From Roman



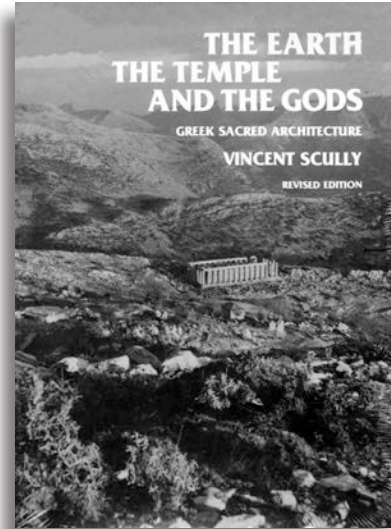
GOLDEN SECTION RECTANGLE



ROOT 2 RECTANGLE

times to Le Corbusier and the present, the Golden Section has appeared in the architecture and art of Western Europe, but always, I will suggest, within a linear context, such as is outlined here.

It is no accident that there is not a hint of geometric measurement in Book IX of Vitruvius's ten books on architecture which provided the proportions for Leonardo's *Vitruvian Man*. Vitruvius was a Roman from the first century BCE, and mathematics, along with Roman culture, had changed more radically than is generally understood from that of Greece.





MIMI SCHERB 1970

Francis Cunningham, 1970-1971
50 x 32 inches, Oil on canvas,
Collection of The Art Students League

OBJECTIVE PROPORTIONS: ADVANTAGES AND LIMITATIONS

In the process of painting *Mimi Scherb 1970*. I found conclusively, that if I were to paint from sight alone, the figure would appear distorted. That is because from a single station point the body parts will appear foreshortened, except at the point where the crosshairs of the world vertical and the world horizontal intersect exactly opposite your eye. In this respect, optical perspective and Brunelleschian perspective are in accord, married to the single station point.

To verify what I was discovering about proportion and perspective in Western art, I went with a friend, Ann-Kristin Hauge, a dancer with the Royal Danish Ballet, to The Frick Collection to look at the sixteen life-size nudes and clothed figure pieces on view. As a dancer she knew the human body. We looked together and when it was pointed out, she saw at once that none of these figures were anatomically functional — Whistler's tiny feet, Veronese's debatable anatomy, Ingres' handsome Countess. This is verifiable by anyone who will apply the proportions of their own body to those depicted in a painting or sculpture, but it comes with a warning. It is death for the appreciation of any work of art to look for and expect of it something the work is not prepared to give — to look at *Guernica* and expect the harmonics of a representational figure, or the refinements of objects as in a Chardin still life when you are looking at a Morandi. From our



PORTRAIT OF COMTESSE D'HAUSSONVILLE
Jean-Auguste-Dominique Ingres, 1845



**THE THINKER:
PORTRAIT OF LOUIS N. KENTON**
Thomas Eakins, 1900

standpoint, we accept Renaissance figures as anatomically functional and objectively truthful just as we accept the truth of a photograph. That is our convention, our mindset. We don't think about these things; it is the way we see.

Returning again to Polykleitos, because their proportions are objective and not governed either optically or by linear perspective, his figures can move as in life. That is what I sought in my painting. I have found through my own work that whatever the subject or the means employed, the artist must balance sight with mind, seeing with knowing. I would have to modify what I saw by what I knew. Now, by combining a non-idealized way of measuring with knowing the objective proportion of each part of the human body, a particular human being can become a subject in a way not accessible to the idealism of either the Greek or Renaissance mindsets. In their cultures there was not the need for this sort of particularity. An ideal of beauty or perfection in the human body or in the expression of a type, such as a

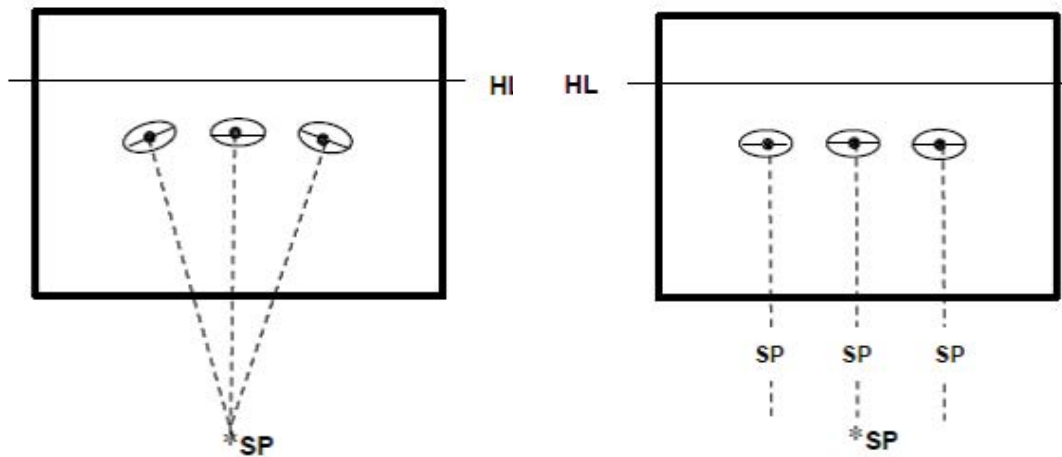
beggar or a washerwoman, was always present. I, too, have an ideal — but it is of another sort. Mine accepts, wonders, enjoys, and paints the multiplicity of humankind. All are potentially beautiful. The continuing search for harmony of the parts in relation to the whole in each subject cannot be restricted, as it was in

Greece and the Renaissance, to an ideal or type. When that harmonic is achieved in the forms of a particular body, beauty is present.

For the reasons I have suggested, neither Greece nor the Renaissance could arrive at a larger visual truth, that of humanity seen through the shapes and the color- values of the particular person. In his own way, this is the direction that Thomas Eakins gave to Gérôme's method of painting. Eakins had studied with Gérôme, but he pushed past formula and technique into the particularity of the individual person. Despite passages of veracity given over to what the eye is seeing, whether in Velázquez, Vermeer, Rembrandt, or in European and American artists from Gérôme through the various Academies, the immediacy of seeing has been placed within a formula — Classical, Baroque, Neoclassical or whatever the schema might be. Like contemporary artists today who are returning to the academic tradition, they embraced both pattern and invention for the forms of the body. They did not envisage the sheer beauty and elegance of a purely visual geometry, standing apart in its abstraction and married to the particular person. They might see it here and there, expressed in parts of the body, but they did not see it extending throughout the entire body, new and fresh with each person in every position that the body may take, and independent of any formula. Such conclusions can come only from using your own eyes.

For all the debt that I owe, how have I loved this freedom from the idealism of Polykleitos and the Renaissance; it is like being able to breathe, when one uses one's own eyes. I can think of no Renaissance nude, south or north, that is constructed as outlined here because, for one, there are no figures in which their objective proportions will allow them to move out of their painted or sculpted position. No matter how alive they appear and how convincing, they are organized from a single station point.

Having emphasized the limitations of Brunelleschian perspective, on a positive note I quote cultural historian, Samuel Edgerton: "Indeed, linear perspective may have been more important to the history of modern technology than to art and science....[This is] what unique Renaissance technique bequeathed to modern technology....No rocket ship to the moon could have been invented, let alone built and functioned, without the humble heritage of Renaissance linear perspective."



SINGLE AND MULTIPLE STATION POINTS

When the lines of sight are parallel and opposite the observed object, there will be no perspective distortion of the objective proportions.

The above diagrams illustrate single and multiple station points. The final diagram illustrates that in order to present any object in its objective proportions, one must conceive and visualize it as it would appear at an infinite distance from one's station point. Then there can be no perspective distortion. In practical terms, one does what John Singer Sargent said: "You must draw the figure from a mile away and paint it as if you were on top of it." That remark covers both far and near — objective proportion and observed color value.

Look at Goya's *The Forge* in The Frick Collection — nothing could appear more alive, but as you look, measure with your eye and compare the actual proportional size of the limbs of the painted body, one to another, and you will see that although they relate in perspective they do not relate in their objective proportions. Because of this, the figure, so full of apparent life, is frozen in place. It cannot move out of its position on the canvas. It isn't that the artists, technically, couldn't handle objective proportions; it's that they didn't. Living in their culture, perhaps they couldn't.

Brunelleschian perspective, with a linear schema that so beautifully places objects in space, was essential to the studies of Leonardo and also Dürer, and to their painting. No one would deny the eloquence of the forms, rhythms and proportions in their work or in Michelangelo, Raphael, and other Renaissance and post-Renaissance masters such as El Greco, or want to change them, but they do not take up the objective proportions with which I am concerned in my work. It is a different world.

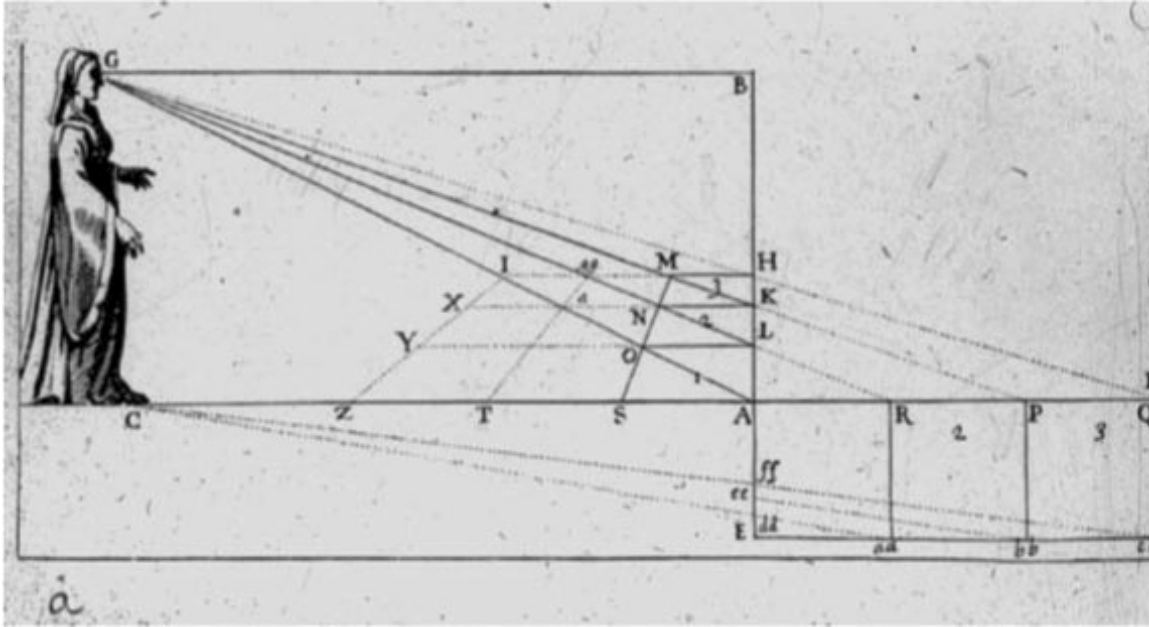
The nude, however it appears in art, is an image of what has been determined about the body. I have outlined limitations in two ways of proportioning the body: the idealism inherent in the Golden Section and geometric proportioning, which restricts the variants in actual human beings, and the linear, perspectival approach used throughout the Renaissance in which each part of the body is located and rendered in perspective. The Greek approach to the body idealizes representation of an individual's parts of the body; in the Renaissance, with Brunelleschian perspective, the body's objective proportions cannot be represented. In the third approach outlined here, each anatomical part of the body is rendered in its objective proportions, but adjusted as it appears from the artist's

station point – the purely visual information is modified by knowledge to make an image which retains the individual's objective proportions. That is the intent. Because this figure is of a particular person who now appears able to function anatomically, there is a capacity for potential movement and a sense of immediacy that is intrinsically different in character from a Greek sculpture, Renaissance painting or sculpture, or from the kind of photographic realism seen in certain paintings and sculptures of today. In its immediacy, it is an image that can shock. It shocked and disturbed observers of my third Hirschl and Adler Galleries exhibition in 1975 and led directly to my dismissal from the Gallery.

Can this visual approach to proportion be said to be objective? With qualifications, I think the answer is yes. There is objective truth in the relationships



THE FORGE
Francisco Goya, 1817
The Frick Collection

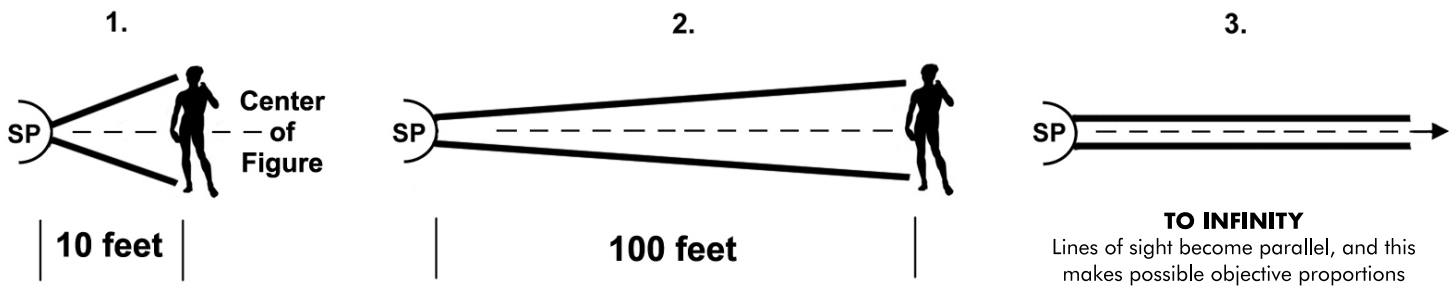


BRUNELLESCHIAN PROPORTION

The single station point and the geometry of space.
A 16th century diagram of arithmetic subdivisions.

that can be determined by the plumb line and in the observed color values. In discussing Mimi Scherb, 1970 (Chapter 11 of *Unframing the Nude*). I have described how this visual evidence must then be integrated with knowledge of the objective proportions - the height and width of the anatomical parts of an individual's body - as these parts would appear when seen head-on without perspective distortion. The act of arriving at a precise shape in the image therefore is a combination of seeing and knowing. It is ultimately an intuitive act based both on the evidence of the eye and of the knowledge of the actual, objective proportions of the forms. It is an act of integration, the doing of which in practice becomes as non-mathematical and intuitive for the artist as it is for a tennis player placing the ball in a tennis match - and it is no less exciting. The result is the creation of an image of a particular person that is anatomically capable of movement. This is its connection with Greek sculpture.

There can be, I believe, a rebirth of the aliveness of humanity in the art form of the nude. Such a rebirth means that in addition to proportion, these nudes must possess the qualities of form – tactile values and movement – without which a figure



STATION POINTS

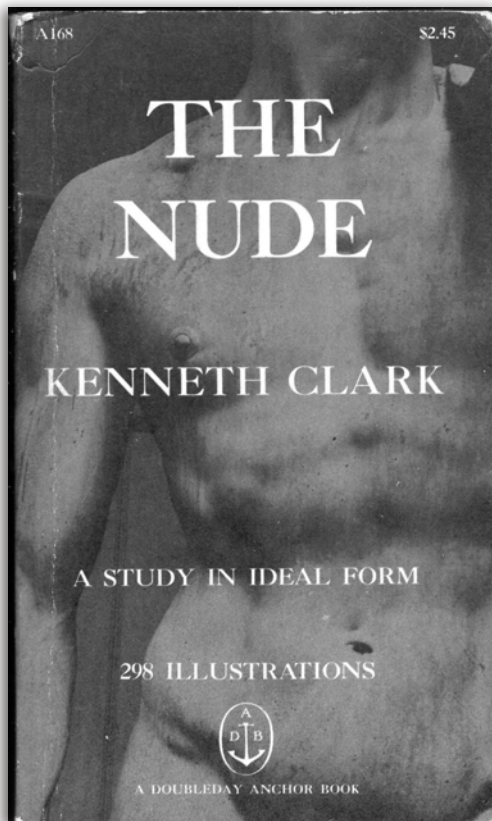
When the object is an "infinite" distance from the station point, all lines of sight will be parallel. There will be no perspective distortion.

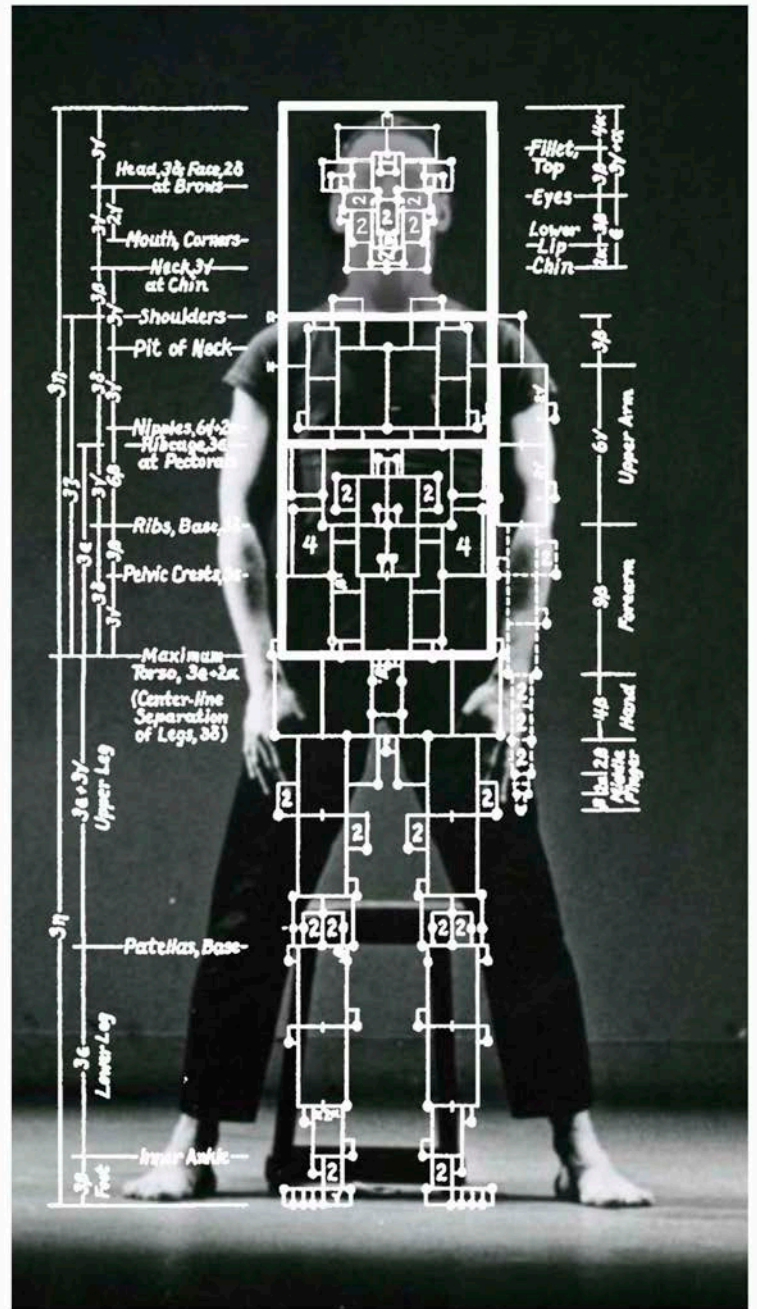
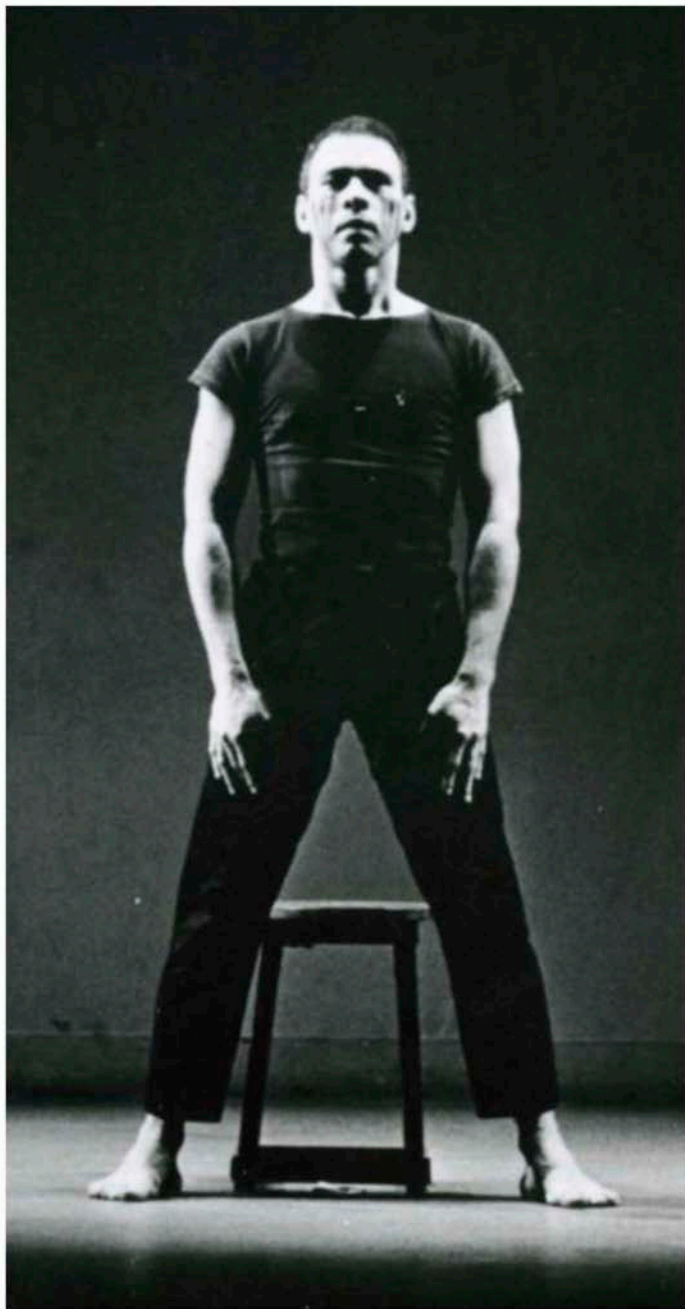
is no more than a representation, merely a symbol. Without these qualities, no matter how well-proportioned, skillful and beautiful such a painted or sculpted figure may be, it will lack the ideated life of mass, weight and movement and so fail

to convince the viewer that it can, in the imaginative world of art, live, breathe and move as would an actual human being.

Returning to Kenneth Clark's statement at the beginning of this essay, it is no wonder the Polykleitan canon has been lost. There is a simple and direct explanation — cultural blindness. The preconceptions of one's own culture constitute a trap. They form what Joseph Campbell has called, "the tyrant Holdfast" — the refusal or inability to let go of our ideas and ways of seeing and thinking. Yet how can we see our own cultural biases when we are living them, and furthermore living them creatively? How else to explain so thoughtful a scholar as Professor Erwin Panofsky, writing with authority in his book on human proportions that the purpose of the Polykleitan canon was, ".... exclusively to ascertain the 'objective'

proportions of the normal human being; in no way did it determine the 'technical' measurements." These words come from the cultural background of perspective and the single station point and they reflect our mindset. Knowing that cultural biases are an ever-present and natural part of us, can we not periodically pour a vial of acid on our conceptions in order to question and reexamine them afresh?





"...LIKE SEEING A GOD IN HIDING BECOME HUMAN." - F. CUNNINGHAM

Dancer and choreographer, Rudy Perez, in his 1966 solo, *Countdown*

Photo: Steve Sbarge

CONCLUSION: A CONTEMPORARY NUDE

As we have seen, Gordon's diagram of the canon shows the parts of the body stacked one on top of another, feet to head. This canon, for a Greek sculptor as for us, will have to enter a different sphere to become human. That is what Polykleitos and other Greek sculptors did —make geometry human. That is what I have sought to do with the human figure in my own way, except that I have done it by sight, through a visual geometry that relates height to width and has nothing whatsoever to do with a canon, geometric or otherwise. You may look at these paintings very abstractly, as unique geometric shapes. At the same time, the “what-it-is”, whether body or object, is there along with its narrative, but on another plane. These aspects of the painting, formal and narrative, are separate but coexist. Any separation in the process of representation of the abstract from what is being represented, is for me, a false dichotomy.

There is nothing vague about visual geometry. The eye can be trained to see objectively. Thanks to Edwin Dickinson, before I ever saw the Doryphoros I was seeing and measuring the parts of the body freed from perspective or any other preconception, as flat, interrelated shapes on the canvas. I would see them with complete detachment from the what-it-is of the body. I would see them as they appear, and without a name. When I looked, I saw a shape, not an “arm” or a “leg”, not a “tree” or a “rock”. At the same time, I was becoming increasingly concerned with the nude as a specific set of shapes - a specific human being, a particular person, and I worked to master the tools that were needed to create such an image. I brought the same concerns to the painting of a cloud, or a tree. Finally, in the process of painting Mimi Scherb, 1970, I found conclusively, that if I were to paint from sight alone, the figure would appear distorted. I have described this in detail in the chapter entitled “Mimi Scherb, 1970 – Objective Proportions and Multiple Station Points.” I saw that optical perspective distorts, as does Brunelleschian perspective. This is because both ways of measuring and determining proportion proceed with the painter's eye positioned in a single station point. Visually, what appears to the human eye in its objective proportions can only be seen when placed directly opposite the eye. One has to use the mind.

Returning once again to Greek sculpture and looking at the diagrams of the Diadoumenos, which are geometric abstractions, it will take you time to see and feel what is virtually a physical sense of the sculpture's presence, to feel the presence of these proportion within the sculpture and to coordinate the harmonic that is expressed in the diagrams with the sculpture itself. The Golden Section squares and rectangles, a set of abstract straight lines, are alive and present in the animated body itself. One needs the work of art itself. Reproduction is no substitute.

I know this marriage of abstraction with representation is the way Polykleitos worked because I have done it myself in my own way - a marriage of abstraction with actuality that has come to feel perfectly natural. It is the way artists work whether figurative or non-figurative, seeing the small relate to the large, the abstract with the actual, the mind and body at one with each other. For me, the large Golden Section rectangles and the ultimate canon that I expect will be forthcoming are like seeing a god in hiding become human. They are the most singular expression in art of anything I have ever encountered, and it is no wonder I felt the way I did in Naples.

Greece and the Renaissance were then. This is now. I am an American painter free from the classical spell of Venus and Apollo (Kenneth Clark in the 1950s was still caught up in it) and also free from the limitations of perspective and the single station point. I use visual geometry to deal with the persons I paint, Black, Brown, White, or otherwise, old or young, with bodies whole or broken. The gods and goddesses that I see are in them; like the Greek gods and goddesses, they too can move about.

This summarizes my debt to Polykleitos and the Doryphoros. What happened in Naples in 1957 pierced my conscious mind — an enhanced sense of life. It also entered a place hidden from consciousness that has taken a lifetime to reveal.



MIMI SCHERB 1970

Francis Cunningham, 1970-1971
50 x 32 inches, Oil on canvas
Collection of The Art Students League

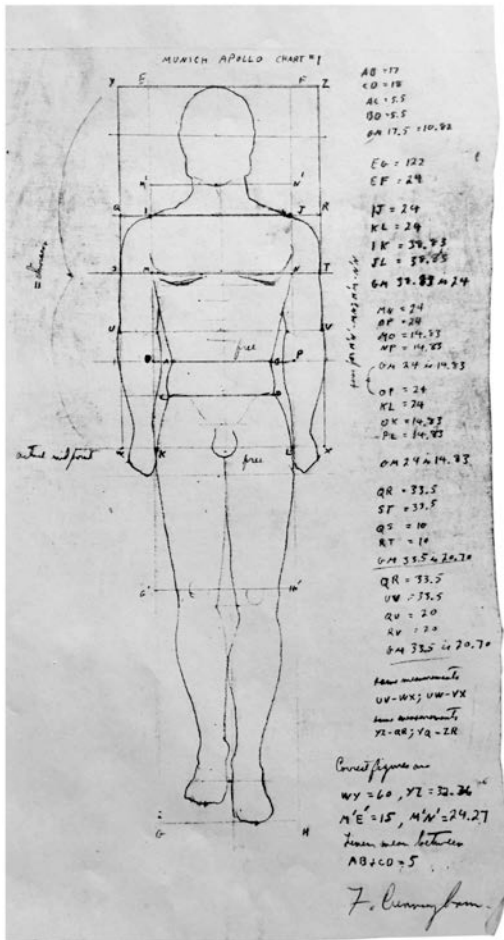
ARCHAIC SCULPTURE AND PROPORTION

In 2018, I took one last look at my earliest diagram of the Munich Kouros from Attica. Then in frustration, I turned again to photographs in Gisela Richter's *The Sculpture and Sculptors of the Greeks* (2nd Edition). Among a series of Archaic kouroi, including the one from Munich that I originally measured, I was particularly struck by another Munich kouros, the Apollo from Tenea with its elegance and its

potential for movement. I later found a photograph in Richter's 4th Edition that was more detailed than the one in the earlier book and I strongly sensed a harmonic. Then the roof fell in — I saw that my earlier diagram of the Munich Kouros from Attica showed the presence of the Golden Section everywhere, but structurally it was, to put it charitably, in “search” mode. I had found the Golden Section present, but I had made a “refrigerator door” out of this kouros. There was no discernible proportional pattern such as the one I saw in the *Diadoumenos*. I had to continue.

And so I looked at the Tenea Kouros, a sculpture contemporary with the Munich Kouros, to see if there was a larger structure such as the one I had found in the *Diadoumenos* and there it was: two overlapping Golden Section rectangles, but at first, not in the same areas of the body. In proportion they were exactly the same as in the *Diadoumenos*, but initially I located them in the area between the pit of the neck and the knees. My measurements, of course, were approximate, but immediately I sought confirmation of this

“discovery,” and found it in six other kouroi. The same schema was present in all seven kouroi, with variations which I ascribe not to the statues but to my inability to determine the placement of lines, primarily at the pit of the neck and the knees. I did not have enough information to determine precisely the alpha/beta Golden Section sequence. The statues in which the Tenea Kouros schema, or one nearly



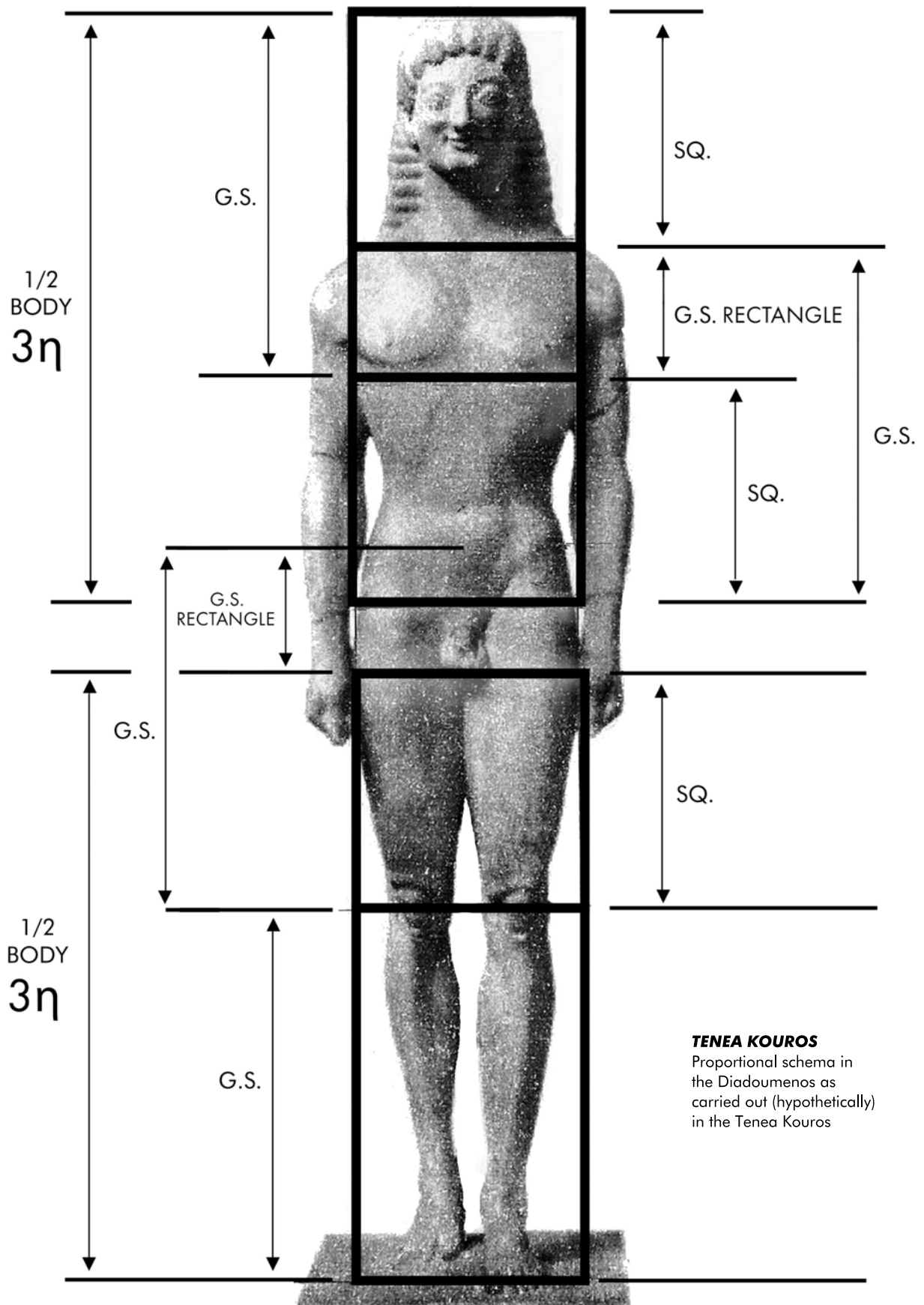
MUNICH KOUROS FROM ATTICA
Original diagram, 1959

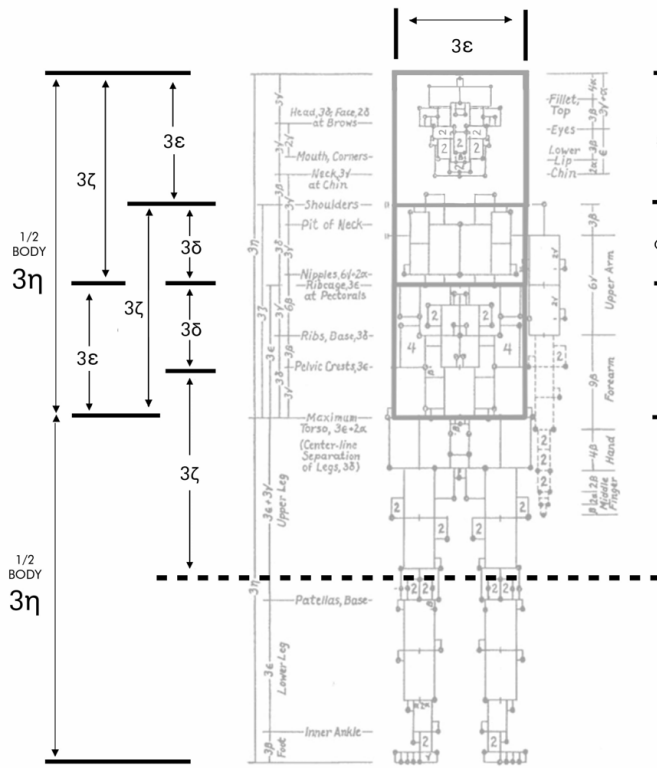
identical, is present are: the Munich Kouros from Attica, the kouroi from Milos, Attica, and Boeotia in the National Museum of Athens, the transitional Strangford Apollo in the British Museum, and the early transitional Youth in the Acropolis Museum (photos taken from Richter 2nd Edition).

In due course I would see that the pattern of two overlapping Golden Section rectangles corresponded in their position to the *Diadoumenos*: from the top of the head to the pubic symphysis. I would change nothing in the geometric proportions themselves but simply move the entire block of squares and Golden Section rectangles into the same position they occupied in the *Diadoumenos*. That resolved several difficulties I was experiencing, such as locating the knees. I found the similarity in proportion between the Polykleitan and Archaic statues to be extraordinary. Most encouraging to me was the fact that years ago such a similarity had been anticipated by Gisela Richter.

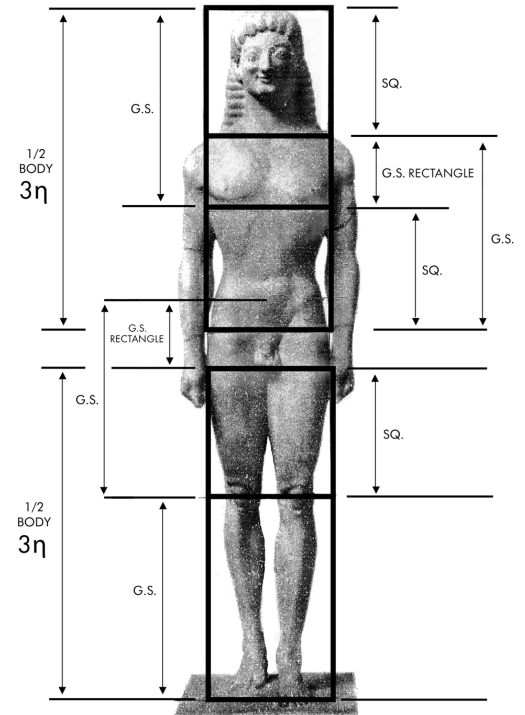
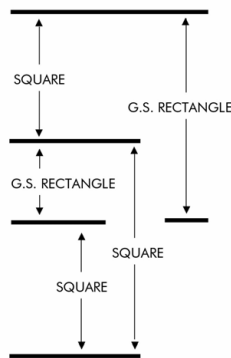
The most salient difference in proportion between the Tenea Kouros and the *Diadoumenos* is the fact that the line that divides the Classical *Diadoumenos* into two halves at the pubic symphysis is not a line in the Tenea Kouros, but a geometric rectangle in the body that incorporates the male genitals. This section is placed in the center of the statue — not, I believe, without reason, although this is speculative. Apollo occupies a particular place among the Greek gods. These kouroi were formerly called “Apollo”. Historically a later god, he is the male god who embodies reason, complementing and also supplanting the earlier earth goddesses of Minoan and Greece (cf. *Vincent Scully, The Earth, The Temple, and The Gods*, on this subject). As with everything Greek, the geometry is there for a purpose. Here, it also adds length to the body and so is a factor in the feeling of greater length and slenderness in the early Apollos as compared with the stockier, more compact Polykleitan figures of the Classical period.

Thanks to the work on the *Diadoumenos*, I could approach these kouroi differently now as compared to when I first measured the Munich Kouros from Attica, and so was on the lookout for the large pattern. All the measurements I made on these kouroi are approximate. I am comfortable presenting the results in this tentative form precisely because the Golden Section is not approximate. In the Golden Section rectangle there is literally a perfect expression of height in relation to width. And so, for example, I know that in the kouroi there is a line that passes





DIADOUMENOS



TENEA KOUROS

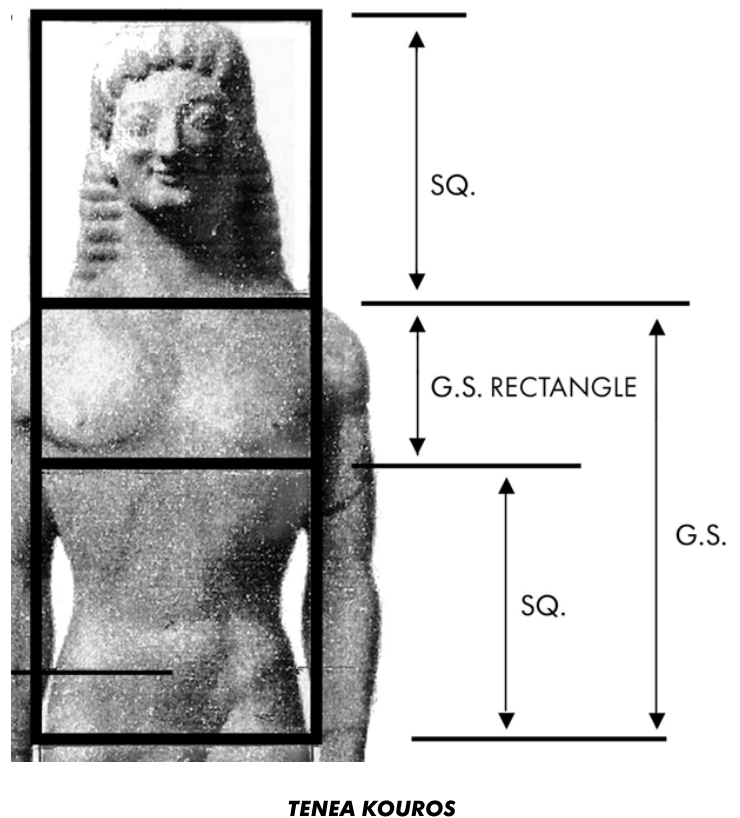
through the knees, but does it pass through, above, or below the patella? Does a line pass through, above, or below the manubrium? As in the Diadoumenos diagrams, these lines will be determined exactly only when alpha and the geometric progression that the sculptor used has been determined.

I also looked for and found repetitions of proportional lengths, (again approximate), as Gordon had determined earlier within the *Diadoumenos*, but now in the body's larger dimensions. From these 6th century kouroi into the Hellenistic period, it would appear that one can be on the lookout for proportions of equal length measuring from the pit of the neck to the pubic symphysis, the pelvic crest to the juncture of the upper and lower leg, and from this juncture to the base of the statue. No doubt there are more such continuities to be discovered, along with variants. The point I wish to make is that this geometric and proportional evidence supports what Richter says in describing the *Strangford Apollo*, 510-500 BCE: "Herewith the general shape of the Greek torso was achieved. It persists through later generations, merely perfected in the direction of greater amplitude of form and harmony of proportion."

Such similarities, as I have indicated, were foreseen by Richter. Writing about the Classic period, she notes, “The canon of proportion which we feel underlying the early Apollos has been developed into a subtler scheme.” That statement, when I first read it, struck me by her awareness of the presence of a canon in the Archaic age and its continuing into the Classic period. It confirmed and supported my earliest expectations. One would not expect so sophisticated a performance as the *Doryphoros* or *Diadoumenos* to come out of nothing. These Archaic kouroi, I believe, are walking canons of proportion. That is what I felt about them when I first saw them.

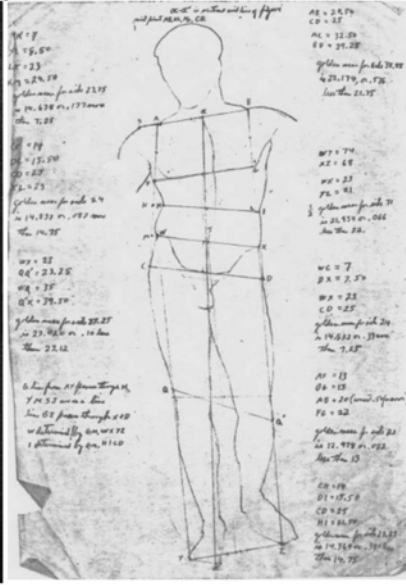
As we have seen, if we compare the structure of the body of the *Tenea Kouros* with the structures of the *Diadoumenos* and the earlier *Doryphoros* the close physical and proportional similarities become apparent. Compare their geometry: in proportion, they are essentially the same body. Their similarities are expressed through an underlying architecture of geometric proportions as indicated in the diagrams of the *Diadoumenos* and *Tenea Kouros*. Their differences are to be found primarily in the handling of movement, the command of modeling of the body’s anatomy, and surface refinements such as the treatment of the hair.

As Richter has indicated, the apparent differences that we experience when looking at Archaic and Classic statues lie primarily in these areas. Such developments are what largely account for the more muscular, relatively stocky appearance and the far more naturalistic expression of surface anatomy, bodily movement and ease in the Polykleitan statue, as contrasted with the sense of length, elegance, and anticipation of movement in the Archaic statue. Their physical and expressive differences have been built on a closely related, nearly identical structure

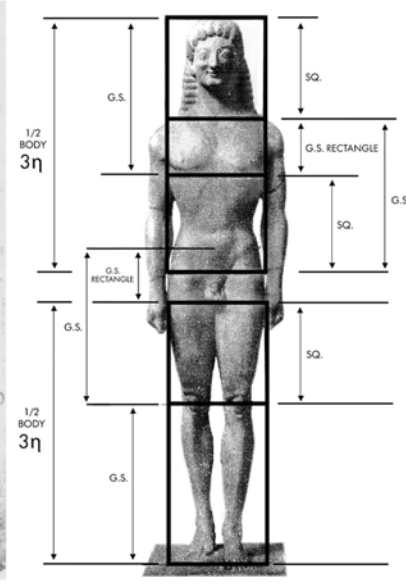




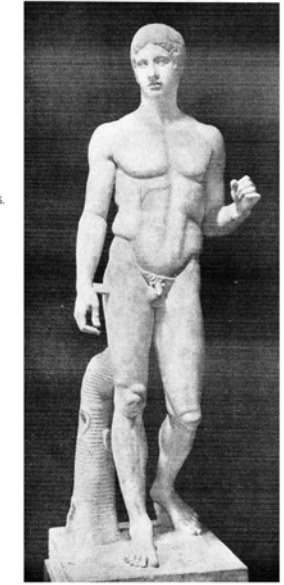
DIADOUMENOS



ORIGINAL QUADRILATERAL DIAGRAM



TENEA KOUROS



DORYPHOROS

of proportion, which effectively acts as a skeleton underlying the muscular and surface modeling of the body as it defines the specific pose.

The above statements and Richter's assumptions, await definitive proof. What makes these statues unmistakably "Greek," the sense of harmony among the parts, comes directly from the underlying schema, a shared canon with only minor variations, which, as Richter suggests, may be found to continue throughout the course of Greek sculpture. The canon conceived as a proportional schema will remain relatively constant, but there will be some notable changes in its height-for-width in the 4th century BCE with Praxiteles and Scopas. These changes create a more slender, flexible figure. Such changes continue into the Hellenistic period.

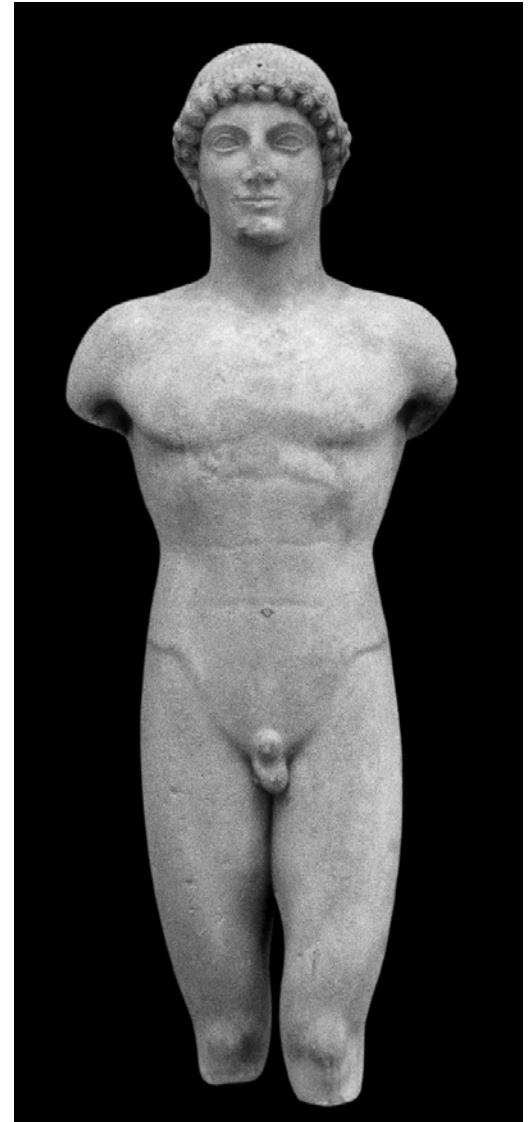
In summary, everything in the diagram laid out in the Tenea Kouros is approximate. I do not have at hand the means to determine the initial alpha-beta unit in the progression that the sculptor used in this statue. As I have indicated, this unit is essential not only for determining the missing smaller dimensions but also in confirming the large proportional relationships as outlined here. Look at these speculative rectangles and squares as if they existed in the air — not carved in stone. They must be seen as able to move a little to the left or right, up or down. With the progression established, they then can become fixed.

• • •

What is it that makes a sculpture look Greek? As we have shown, I believe the underlying structural pattern to which Richter repeatedly refers - a canon - is the governing factor. The “discoveries” outlined here and expressed in the diagrams, may help to further the search to crack the shell of how the Greeks proportioned their sculptures. That is a far larger question than finding the canon of Polykleitos.

Geometry as it appears here and is applied to the volumes of the body, clearly was not conceived by the Greeks as being bound by a rigid formula. There is abundant evidence of the length of time it took sculptors to explore and overcome problems such as arriving at a plausible three-quarter view of the body in relief sculpture, or in dealing with the twist between the frontal view of the chest and a profile view of the legs when creating a sculpture in the round or in relief. Greek sculpture evolved over time. A harmonious wedding of geometric proportion with the anatomy of the abdominal region of the waist took years to be achieved.

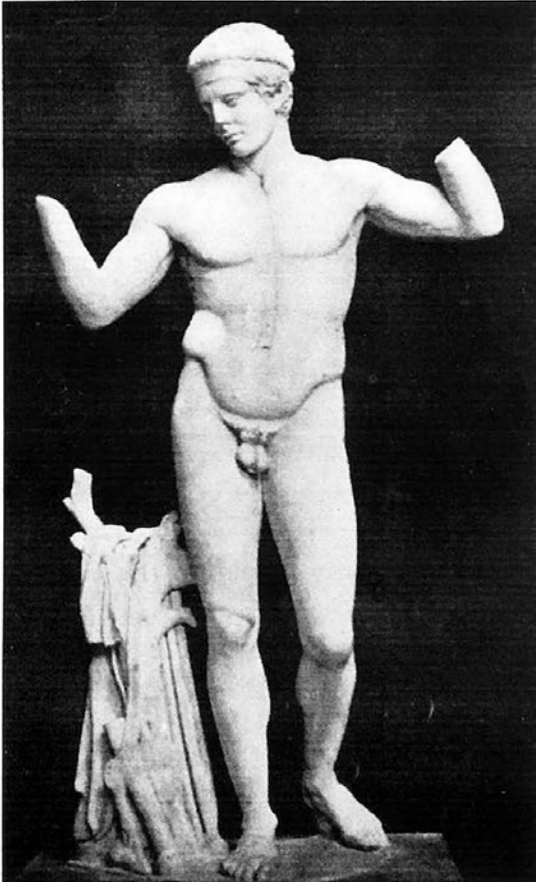
In summary, at an early stage in the development of Greek sculpture, the sculptors would have established the major anatomical points on the body as determined in a geometric canon. Until the 4th century BCE, they made comparatively few modifications of these proportions. They were free to work on the anatomical forms in the transitions between these major anatomical points. During the Transitional period they developed a wonderful understanding of anatomy and movement. When it became necessary, they were free to modify the canon. These developments constitute the history of form in Greek sculpture. The Greek concept of geometrically proportioned volumes in harmony with anatomy and movement to describe the human body had to be organic and flexible. Otherwise, at some point



STRANGFORD APOLLO
510-500 BCE
Early transitional period

the sculpture could have become frozen and perhaps as unchanging as it was in Egypt.

No matter where you look, there is an underlying simplicity that characterizes Greek sculpture. If you will take tracing paper and, using a straight edge, draw



THE DIADOUMENOS OF POLYKLEITOS

c. 430 BCE
National Museum of Athens

straight lines over a photo of the Diadoumenos - with straight lines outlining the entire body you will see that the body's volumes fit within a figure "T". The short arm of this "T", containing the arms and head, is at an angle to the vertical stem, which contains the volumes of the body. Such abstract simplicity of composition is taken in by the viewer and is present in our experience of the statue, whether the conscious mind is aware of it or not. One aspect that fascinates us about magic is that something is always just out of reach. We see it, but we cannot grasp it. That, for me, is Greek sculpture. There is something there, a common note that unites the Archaic with the Hellenistic, a dimension just out of reach. It looks at the commonplace, the human body, and sees it lofty, elevated, and no matter how violent the action, serene. It makes my spirit sing. The Greeks had a mindset that could use the Golden Section as a means of expression. That was their world. I have found such a wonder to be alive in the

individual human body, each with its own harmony of proportion — a delight to the eye and the spirit. That is why I have not imposed a formula upon it. Let the particular body sing its own song. That is my tribute to Greece.

EPILOGUE: GOING FORWARD WITH PLUMB IN HAND

*"Judgment also will I lay to the line,
and righteousness to the plummet:
and the hail shall sweep away the refuge of lies,
and the waters overflow the hiding place."*

ISAIAH 28 v. 17

If the cultural frames from the past are removed, what next with the nude? What manner of thing will it be? A contemporary image that looks at people and sees them as they are? I propose a nude that sings of truth, turning prose into poetry.

What is more needed in the world today? This nude focuses on the product of what we spend our time on — ourselves — quarreling, debating, loving, accepting, and denying. Quietly without words it shows us who we are, capable of movement and change. It offers aesthetic focus on what we do and who we are because there is truth in the midst of our lying politics, our climate change denial, and all the rest. This nude is not judgmental, telling people who they must be and what they must look like. It allows people to be themselves. It does not preach; it is not propaganda working for a cause, any cause other than ourselves. It knows neither race nor creed. It knows no label. It is us, stripped bare in our humanity, standing as it were, before an eternal mirror.

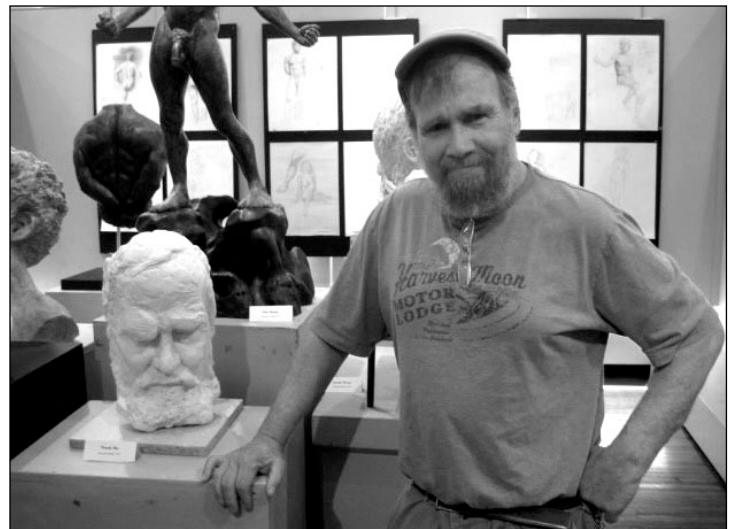
Having a body and moving about, I cannot divorce my looking from the plumb and I cannot divorce the plumb from truth: "Judgment will I lay to the line and righteousness to the plummet". Isaiah is saying that judgment and righteousness come, not arbitrarily from oneself, but through the plumb, from beyond us. (I keep this quote in my wallet, so I can access it and be reminded of it at any time.) That is where a link between the nude and truth is made – the plumb is physical, mental, moral, and spiritual, appearing altogether all at once. Color-value follows and refines these connections. Truths of shape and color can be communicated to you by

the artist in the depiction of the body and all of this you will see and respond to if your eyes are open, and your mind is clear.

This unity of being is sensed first, and then it is understood. The plumb presents a way of seeing nature — still life and landscape, as well as in the figure. It unites the unseen with the seen — the world vertical and horizontal with the shape of a lemon or a tree, as with the body. Sight and mind work together in harmony. The nude I have in mind cannot be divided into warring camps — classical, modern, old, young, straight, queer, Democrat, Republican. It defers judgement. It states only that we must, as we should, be seekers after truth, allowing for every one of us the freedom to search, to think and to be.

It is not a nude that needs to be created; that has been done. Barney Hodes and I have sculpted and painted this nude, and with students and faculty we have worked as one toward its construction at The New Brooklyn School. Now it is time it stepped out onto the stage. The time has come for it to evolve and be developed and to cease existing in shards of plaster, locked in our studios or gathering moss in a backyard. (I am being literal).

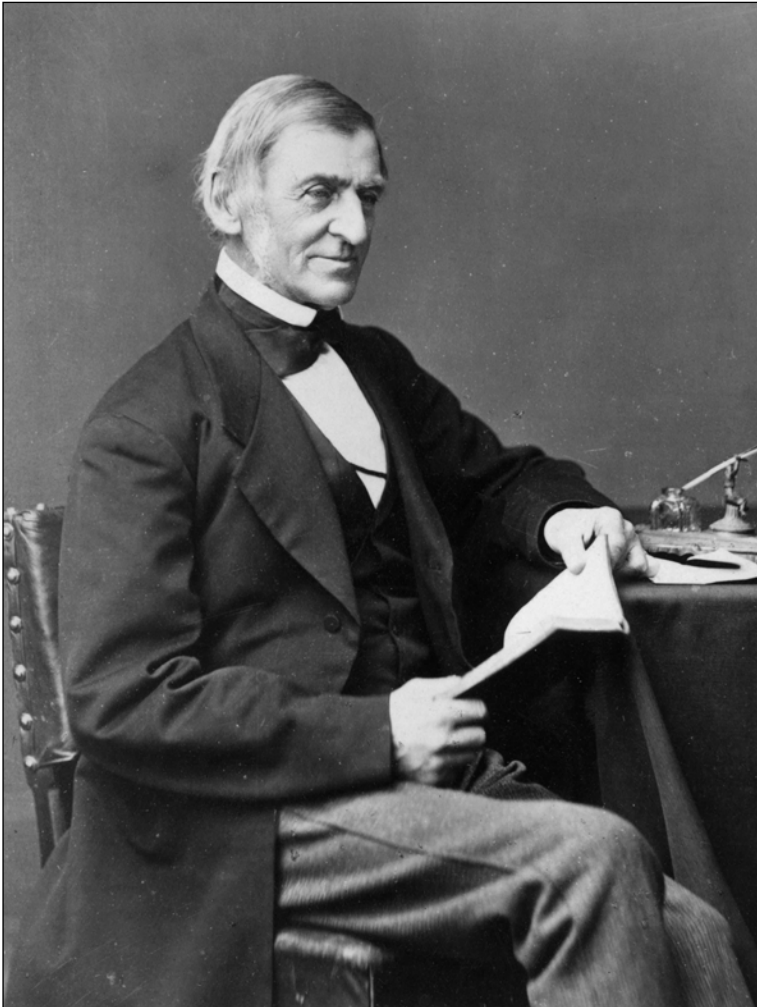
It is time to give this nude an audience. Where to turn — the galleries are moribund. To the museums? For years they have been preoccupied with setting up exhibitions, acquiring and displaying their wares, publishing catalogues, and enabling erudite conversations to take place among the curators. Where is the public? It is standing in line to pay increasingly high admission fees to get in, whereupon it is permitted to take photographs, listen to learned twitter on its earphones, read from descriptions and depart. As for the public's need to be shown the pleasures of seeing and enjoying works of art and to establish a conversation with them, one-on-one, the museums are as bankrupt as were the clergy as regards their congregations when Emerson, in 1838, delivered an address at the Harvard Divinity School, calling to order the



BARNEY HODES

graduating class and his own clerical colleagues. To preachers rooted in tradition and unable to see current needs, he had these words: “But the man who aims to speak as books enable, as synods use, as the fashion guides, and as interest commands, babbles. Let him hush.”

For such temerity he was not invited to speak at Harvard again for thirty years. He had spoken truth to power.



RALPH WALDO EMERSON

Emerson was a clergyman who knew his subject firsthand. What is needed now is a comparably qualified museum person to hold up the plumb for his or her fellow directors and trustees, in an examination of their present relationship to the public. In Emerson’s words, “... speak the truth and all nature and all spirits help you with unexpected furtherance.”

When there is no stage there can be no audience. This has been the case for so many fellow artists I have known personally, both figurative and non-figurative. Some of them have been mentioned here. It is past belief that the galleries or museums will do anything to ensure that artists will receive a commission on the resale of their work or any

such measure that would help artists stay alive to do their work. “Oh,” they say, “that is not our responsibility.” Where is their concern for younger artists? The museums, like the galleries, follow fashion, and what sells. The likelihood for change is about the same as if tobacco companies were to give up tobacco and cease cultivating addiction in younger clientele, or oil companies their development of oil

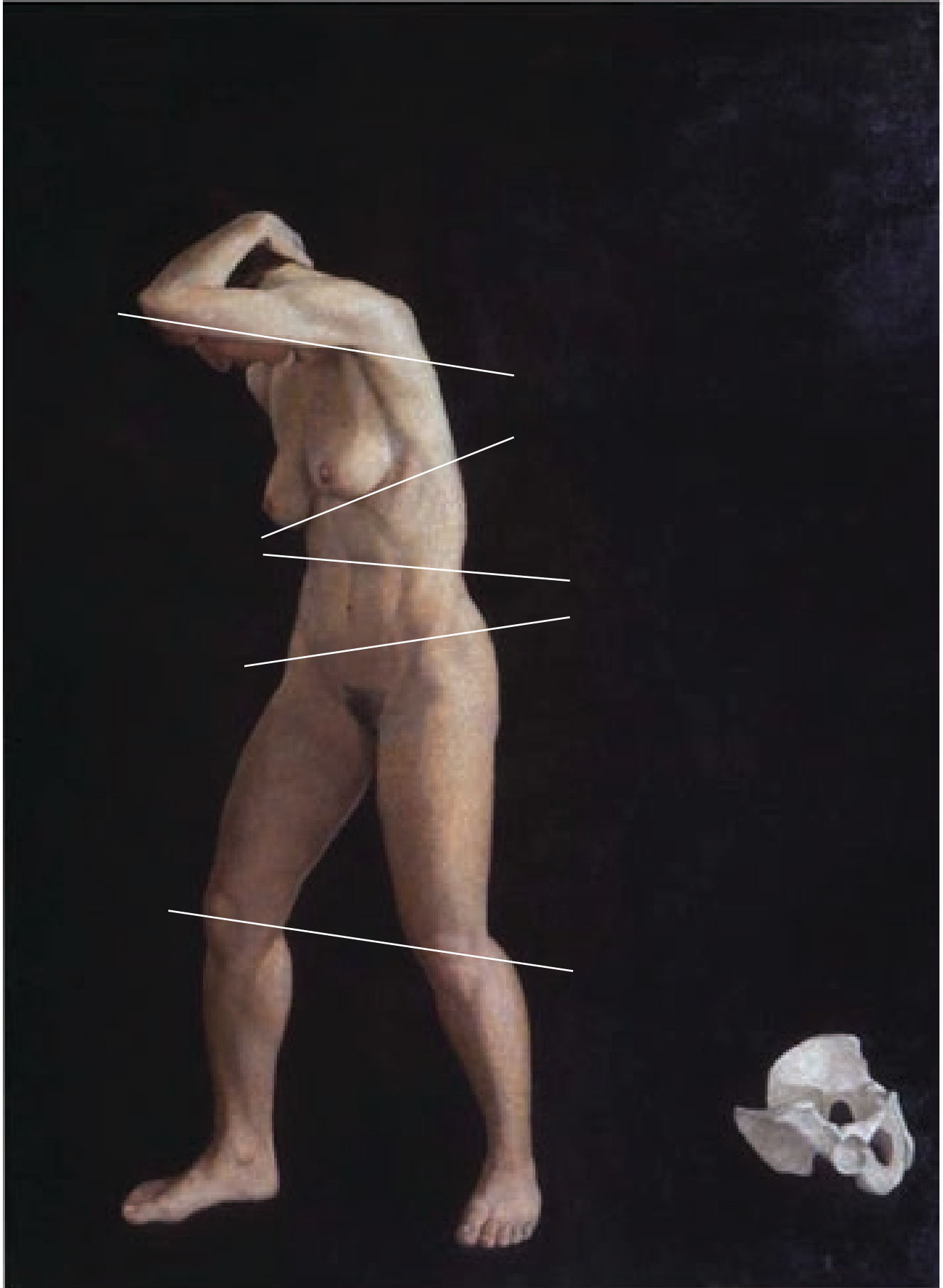
fields and gas deposits in the interest of climate, or banks their interest rates. In such matters, they say no government or outside interest has the right to interfere. It is a world of survival of the fittest in a nature that knows no forgiveness, no pardon for error, but for which payment is due and will be paid.

And so I suggest that some intrepid person try to find among the more than 2,650 billionaires alive today, someone who would fund a comparatively cheap enterprise, such as the ceiling of a public building, an airport terminal, an auditorium, public library or better yet, a Statehouse — to be adorned with nudes in various positions with no more attention to telling a story than Michelangelo's *Ignudi* on the Sistine ceiling. These nudes will illustrate for the passing public what I have been talking about, communicating with the clarity of a Greek vase painting. I believe in the public, that it can and will, see and respond to truth. I believe that we individuals who constitute the public can and will, think and feel for ourselves without the continual interventions and instructions on the part of experts. It should be a chief purpose of museums to accomplish just that, to liberate and support the individual person in their looking.

Having seen this happen in my own work, and as an instructor in the work of students, I know that it can be done. But the creation of an audience cannot take place if the work is not shown.

Do not be deluded into thinking a computer image can show the work of art in its true dimensions. There is nothing virtual when a tornado or a forest fire is at hand and there is nothing virtual in experiencing firsthand a work of art and the fire in one's soul. The link between the work of art and the viewer is real. The work must be shown in order to be seen and experienced.

To those who say it can't be done, there is joy in the doing. That is what is ahead.



EVE (SHARON) - THE ABSTRACTION WITHIN THE BODY

Francis Cunningham, 1986
76 x 56 inches, Oil on canvas
Private collection