

The Beauty of Harmony:

The Case of Albrecht Dürer's Theory of Human Proportion

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Introduction: The Concept of 'Harmony' and the Theory of Human Proportion

The concept of 'Harmony' has been regarded as a representative of traditional value in European Civilization. It has influenced the historical formation of Western culture since the Classical Period.

The theory of human proportion is one human cultural activity. It is based on the thought that the harmony produces ideal beauty. Theorists aim to attain the standard of the ideal human body, called the 'Canon'. This can be expressed in mathematical proportions.

This theory, therefore, closely relates to the mathematical thought of each period. This fact suggests that the cultural value of each phase of civilizations correlates with human intellectual/scientific activities in the history of the theory of human proportion, namely its history. This may be an instance in which a cultural or civilizational value not only inspires some cultural activities but also inspires the formation of scientific knowledge.

This paper discusses the cultural or historical elements of scientific knowledge through the analysis of mathematical methods in the theory of human proportion, particularly the case of Albrecht Dürer (1471-1528). Dürer worked on the problems of human proportion eagerly throughout his lifetime. He began researching for the Canon by Vitruvius, but his thoughts on ideal beauty in the human body had changed by degrees, and at the same time, his mathematical methods also changed.

First, I consider the Vitruvian Canon, which had a great influence on Dürer's theory. Thereafter, I discuss the copper engraving *Adam and Eve* (*Adam und Eva*, 1504), regarded as an important product of Dürer's early research on human proportion. Second, I focus on Dürer's drawings and the meaning of 'the Vitruvian Man' in the second book of his main theoretical work, *Four books on Human Proportion* (*Vier Bücher von menschlicher Proportion*, 1528) [1]. 'The Vitruvian Man' has been received as a symbol of the beauty of harmony in the human body in European cultural history, and accordingly it is an appropriate subject through which to think about the problems of value and scientific knowledge.

Finally, this paper aims to demonstrate an aspect of cultural or civilization-related elements; one that is contained essentially in human knowledge.

1. On the Vitruvian Canon

The Vitruvian Canon is based on the description of the ideal human body in *The Ten Books on Architecture* (*De Architectura libri decem*) [2] by Marcus Vitruvius Pollio, a Roman architect from the 1st Century B.C. Vitruvius's book is regarded as the oldest existing theoretical work for architecture in the European world.

Vitruvius referred to the natural proportion of human body in the 3rd book of his work:

For Nature has so planned the human body that the face from the chin to the top of the forehead and the roots of hair is a tenth part; also the palm of the hand from the wrist to the top of the middle finger is as much; the head from the chin to the crown, an eighth part; from the top of the breast with the bottom of the neck to the roots of the hair, a sixth part; from the middle of the breast to the crown, a fourth part; a third part of the height of the face is from the bottom of the chin to the bottom of the nostrils; the nose from the bottom of the nostrils to the line between the brows, as much; from that line to the roots of the hair, the forehead is given as the third part. The foot is a sixth of the height of the body; the cubit a quarter, the breast also a quarter. The other limbs also have their own proportionate measurements. And by using these, ancient painters and famous sculptors have

attained great and unbounded distinction.

(Book III, C.1, P.2)

Initially, he showed his Canon as a fractional ratio of each part to the whole body and presented two geometrical images to us, namely 'homo ad quadratum' (a man inscribed in a square) and 'homo ad circulum' (a man inscribed in a circle). An example of this is as follows:

...Now the navel is naturally the exact centre of the body. For if a man lie on his back with hands and feet outspread, and the centre of a circle is placed on his navel, his figure and toes will be touched by the circumference. Also a square will be found described within the figure, in the same way as a round figure is produced. For if we measure from the sole of the foot to the top of the head, and apply the measure to the outstretched hands, the breadth will be found equal to the height, just like sites which are squared by rule.

(Book III, C.1, P.3)

This image also is called 'the Vitruvian Man'. It has been especially inspiring to artists and theorists in the Renaissance to consider the ideal beauty of the human body as a symbol rather than as a practicality. That is to say, it had historically signified a harmonious relationship between the universe as macrocosm and the human as a microcosm.

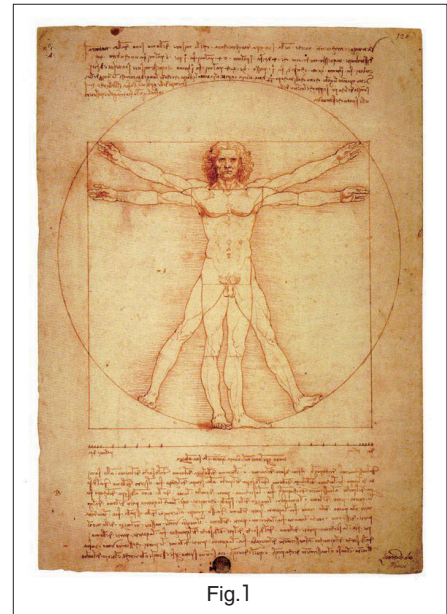


Fig.1

However, what Vitruvius intended to say about the Canon is not necessarily clear. His description lacked mathematical logic, and there was not enough explanation to precisely understand his image. Hence, theorists in later ages have needed to complement or change Vitruvius's words, in attempting an exact drawing of the image. Although a famous picture by Leonardo da Vinci (1452-1519) <Fig.1> is perhaps the most perfect example of this image, it has been clarified that Leonardo also revised the Vitruvian Canon for his drawing [3].

2. The Early Phase of Dürer's Research

Besides being a German painter, Albrecht Dürer was also a contemporary of Italian artists like Leonardo. He was interested in the rational and theoretical approach to the plastic arts too, particularly the theory of human proportion. He had begun to devote his energies to research for the ideal beauty of the human body since the mid-1490s. His thought and method had been changing; however, through books and manuscripts by Dürer, we found that Vitruvius was his most important guide from the beginning to the end of his research.

The young Dürer had, in fact, referred to the Vitruvian Canon and had tried to construct an ideal human figure, one following fractional proportion through the geometrical method of drawing. That is to say, Dürer had accepted the rules that were in accordance with a simple fractional ratio and fixed the contour with a ruler and compass as much as possible, because he intended to provide an objective expression of the ideal

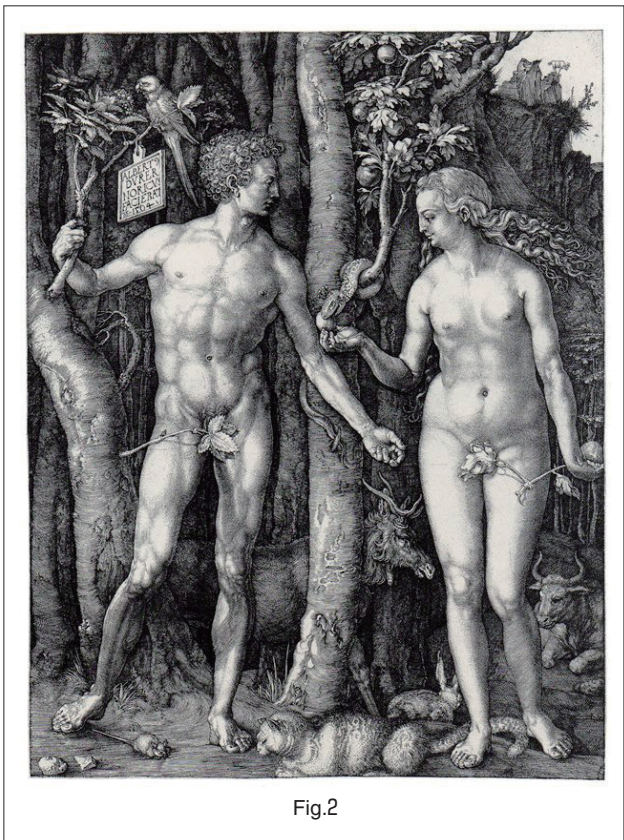


Fig.2

beauty of the human body. This method had been used during the early phase of Dürer's research. His masterpiece of the copper engraving, *Adam and Eve* (*Adam und Eva*, 1504) <Fig.2> was a representative product based on mathematical proportion and geometrical method.

Using symbols, '*Adam and Eve*' has expressed the classical ideal of beauty. Both the bodies of Adam and Eve are ordered mathematically. Besides, the geometrical method in itself is important for the symbolism of the subject in this drawing. Since classical times, geometry has been synonymous with perfection beyond human intelligence. Geometry is the only way for human beings to exactly grasp a continuous quantity. Accordingly, the geometrical image of the human body by Vitruvius also, in itself, meant absolute harmony.

In fact, Dürer's consciousness concerning geometry is not necessarily clear in this phase. His drawing may be a kind of geometrical expression that is not based on mathematical logic but on a Gothic sense of form [4]. However, in any case, it is certain that the idea of human body in this drawing initially came to his mind due to an encounter with Italian art. It should, therefore, be constructed objectively using a mathematical method.

Here, we thus emphasize the meaning of geometry rather than its direct effectiveness for plastic art. Dürer has tried to symbolically realize the beauty of harmony. That is, in other words, an attempt to reconcile the objectivity of beauty with the geometrical method, which itself equals absolute harmony.

3. The Figure of 'the Vitruvian Man' in *Four Books on Human Proportion*

After the completion of '*Adam and Eve*' (1504), Dürer visited Italy and noticed that the idea of Italian beauty differed from that of his own country. He was troubled by this discrepancy, and finally abandoned it for the recognition of only ideal beauty. This collapse also influenced a change in his mathematical methods. He turned his eyes from the geometrical world to the real world of nature. In the latter, there is a living body that has infinite variations and the possibility of motion. Dürer created systems of measurement to capture the diversity of the real human body. Hence, the two-dimensional drawings created using the geometrical method disappeared, and following this, a massive amount of data using three-dimensional, anthropometric measurement had appeared. He produced the patterns of the human body that became candidates for the ideal of harmony.

Dürer's main work, *Four Books on Human Proportion* (*Vier Bücher von menschlicher Proportion*, 1528) was a product of his extraordinary quantitative search. It is of particular importance to note that the second book provides 18 examples of human proportions (8 male patterns and 10 female patterns), constructed using a complex anthropometrical method. It is interesting that these human figures include one *homo ad quadratum* drawing and six *homo ad circulum* drawings <Fig.3>. Such drawings appear to contradict the intention of the second book.

Why did Dürer draw these geometrical images? I think that the method used in the second book was indispensable to concretize this symbolic image. Dürer's method is called the system of 'Meßstab'. It is a kind of scale which is always one-sixth of the height of the measuring body and is divided as follows: 1 'Meßstab' = 10 'Zall' = 100 'Teil' = 300 'Trümlein' <Fig.4>. Using this system, Dürer measured in detail the length, width and thickness of each part of the human body, and its data was indicated in a quantitative manner. This is close to the expression of the decimal fraction in the present day. Viewed from this perspective, 'Meßstab' can be regarded as an extremely precise system for measurement; it can evaluate the minute sizes along the subtle forms of the human body.

It follows from what has been said that this method was able to minutely set the positions of each part of the human body, with this capacity leading to a numerical expression of continuous change through motion. This is the meaning of the drawing of 'the Vitruvian Man', because it is the key to solving

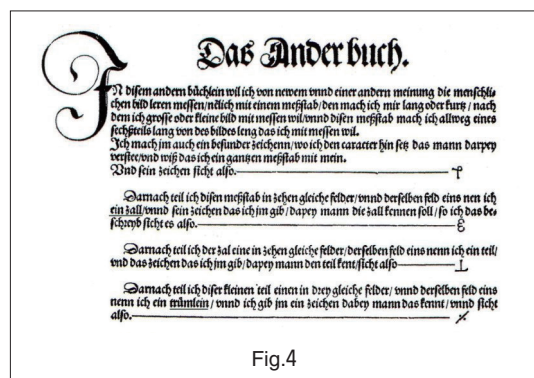


Fig.4

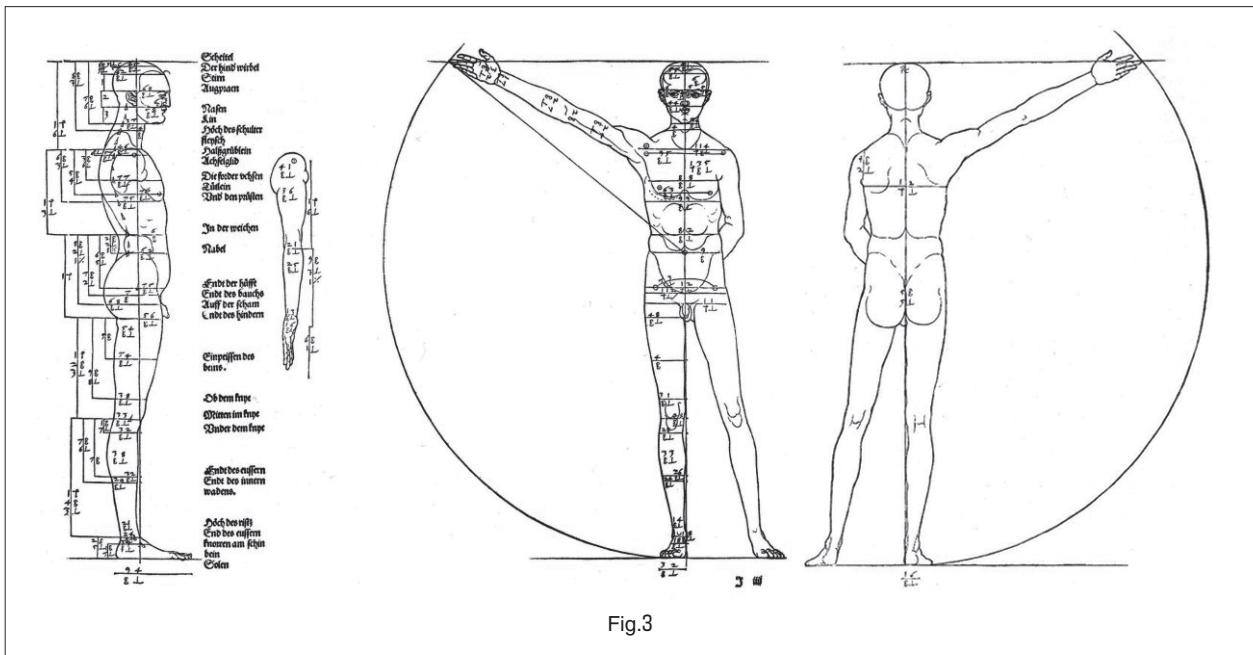


Fig.3

the mathematical difficulty which attended the realization of that image: the drawer is required to reconsider the human figure as a moving body, keeping the fixed proportions and adjusting errors occurring through the movement of the body as consistently as possible. There are two mathematical aspects in this figure; the numerical proportion and the geometrical figure are each based on different mathematical schools of thought [5].

4. The Meanings of Drawings in the Second Book and Two Points of Discussion

The drawings of the second book offer two points for discussion. The first is the problem of the symbolism of the ideal human body. In section 2, we discussed 'Adam and Eve'. It has been confirmed that this picture has a symbolic meaning that is based on the perfection of geometry. The figures which are discussed and expressed in the second book, on the other hand, didn't signify the symbolical ideal human body any longer: The transcendental order is not embodied in the ideal world by the geometrical method but can be rendered real by human hands through the use of numerical processing. In sum, we must consider these figures to be a kind of specimen of living body with infinite diversity that, at the same time, lack the absolute. Such figures are brought about through mathematical thought based on a discrete quantity that, nonetheless, cannot grasp perfection. It seems that the theorists of the Renaissance were attracted by this metaphysical idea, although they tried to approach it using human sense and human hands.

The second point is the relationship between value and scientific knowledge. Leading with the idea of the beauty of harmony as a classical value, Dürer researched the theory of human proportion. Nevertheless, his mathematical thought gradually turned away from the idea at the beginning of this research. However, it appears that it in fact began to develop independently. The method of 'Meßstab' may contribute to the drawings of 'the Vitruvian Man', but its mathematical intention is incompatible with the essential idea expressed in the theory of human proportion. Dürer's method contained elements that deviated from geometrical harmony but nonetheless connected to the scientific knowledge of the next age, such as the decimal system, statistical method, among others. This is not to say that Dürer created new mathematics but that his work involved some concepts that proved useful in modern science.

This case of Albrecht Dürer suggests that cultural value can lead to scientific knowledge. It also establishes the possibility of the development of a new science that differs from the philosophical or cultural intention at the beginning. In other words, it is clear that science contains, in essence, cultural or historical elements. At the same

time, it also possesses autonomy or generality.

However, it is important to note that the science of the contemporary period vastly overrates this autonomy, while concurrently underrating the particularity that human knowledge originally had. Some aspects of this, such as essential, living human knowledge, have been engraved vividly in the work of the Renaissance.

References

[1] This paper bases on the following books:

- A. Dürer, Albrecht. *Vier Bücher von menschlicher Proportion*. London: G. M. Wagner, 1970.
- B. Dürer, Albrecht. *Vier Bücher von menschlicher Proportion (1528) mit einem Katalog der Holzschnitte*. Published, commented and translated into contemporary German by Hinz, B. Berlin: Akademie Verlag, 2011.
- [2] Vitruvius Pollio. *On Architecture*. 2 volumes. Translated into English by Granger, F. New York: Putnam, 1931–1934, Vol.1, pp.158–161.
- [3] cf. Zöllner, F. *Vitruvs Proportionsfigur. Quellenkritische Studien zur Kunstliteratur im 15. und 16. Jahrhundert*. Darmstadt: Wernersche Verlagsgesellschaft, 1987, pp.77–87.
- [4] cf. Panofsky, E. *Dürers Kunsttheorie: Vornehmlich in ihrem Verhältnis zur kunsttheorie der Italiener*. Berlin: G. Reimer, 1915, pp.91–95.
- [5] cf. Nakamura Tomoko. Ein Problem zur vitruvischen Proportionsfigur in Buch II von ‘Vier Bücher von menschlicher Proportion’. *BIGAKU (Aesthetics)*, 2013, 64 (1), pp.95–106. (中村朋子, 「デューラー『人体均衡論四書』第二書における「ウィトルウィウスの人体図」の問題」, 『美学』242号(第64巻第1号), 2013年, p.95–106.)

Figures

- Fig.1 Leonardo da Vinci, *The Proportion of the body ('the Vitruvian Man')*, c.1490. Pen, ink and watercolour over metalpoint, 344×245mm. Venice, Gallerie dell' Accademia, Inv. 228.
- Fig.2 Albrecht Dürer, *Adam und Eva*, 1504. Engraving, 251×194mm. Karlsruhe, Staatliche Kunsthalle. Inv. I 776 a.
- Fig.3 Albrecht Dürer, the figure of man like ‘*homo ad circulum*’ (fol. 13v, 14r, 14v), quoted from [1]-B, pp. 120–121 (<Nr. 277.46, 47, 48>).
- Fig.4 Albrecht Dürer, explanation of the ‘Meßstab’ system (fol. F4v), quoted from [1]-B, p. 86.