THE GEOMETRIC ANALYSIS OF FOUR GERMAN PAINTINGS

IN THE NATIONAL GALLERY OF ART

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THE GEOMETRIC ANALYSIS OF FOUR GERMAN PAINTINGS IN THE NATIONAL GALLERY OF ART

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CHAPTER I

INTRODUCTION

The Problem

In a recent study of the geometric analysis of various masterpieces of many periods dating from early Egyptian to contemporary times, the author noted with particular interest the structure of the paintings of the German Renaissance masters.[1] It seemed that the Germans used a simpler geometric plan in their compositions than did the Italian Renaissance painters. The writer was inspired to make further investigation to determine if such a theory were true.

Since the author had spent a year in Nuremburg, Germany, the birthplace of Albrecht Dürer, she was especially interested in making a study of his paintings in order to determine his style and the influence that the Italians who were his contemporaries might have had upon his work. During the past two years she has had the opportunity to visit frequently the National Gallery of Art in Washington, D. C. where some of the original works of the German

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[1] Unpublished manuscript of a study undertaken by the author in the winter of 1947.

painters are available for analysis. The fact that the gallery houses only a very small collection of German Renaissance paintings and only one that is attributed to Dürer was a disappointment; but the questionable attribution was an even greater challenge. Perhaps through a geometric analysis of the painting there might be found some similarity in the structural composition that would add support to the belief that it was the work of the great German artist.

Scope of the Study

A painting by Hans Holbein, the Younger, and two paintings by Lucas Cranach, the Elder, were also chosen to study in order to determine to some degree whether there were certain traditions that all the Germans followed in constructing the plans for their compositions or whether each had an individual plan. Through the courtesy of the national gallery the writer was able to obtain excellent photographs of all four paintings, thus enabling her to make careful study of the interrelation of parts toward one another and toward the whole composition. As an aid in making the comparison valid, one other painting by Dürer (Figure 10) and one by Holbein, the Younger (Figure 12) have also been analyzed. All analyses have been compared with the analyses of the Italian paintings

that were made by Kitty Blanks Anderson[1] and Barbara Ruth Hamilton.[2]

Procedure

After a review of the research of scholars in the field, the author will present her findings in the following divisions: Chapter II will give an account of the life of Albrecht Dürer and discuss the author's analysis of the painting "Portrait of a Man." Chapter III will deal with the biography of Hans Holbein, the Younger, and present an analysis of his painting "Edward VI as a Child." Chapter IV will give an account of the life of Lucas Cranach, the Elder, and include an analysis of two of his paintings "A Princess of Saxony" and "A Prince of Saxony." In conclusion, the author will compare in Chapter V the structural analyses of the compositions of the German painters and discuss the influences that may have been determining factors in the compositional planning of their work.

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[1]Kitty Blanks Anderson, "Geometry as the Structural Basis of Composition in Paintings," Unpublished Master's thesis, Department of Art, North Texas State College, 1942.

[2]Barbara Ruth Hamilton, "Golden Proportion Used by Titian and Raphael," Unpublished Master's thesis, Department of Art, North Texas State College, 1942.

Review of Literature

The question that has spurred scholars on to investigate the secrets of classical composition is: "If mathematics possess supreme beauty, does supreme beauty possess mathematics?" Unfortunately the Egyptians, the Greeks, the Italians, and the old masters of the Renaissance left no detailed account of the procedure in the planning of their great works of art. But the architects, the sculptors, the painters, and the craftsmen have left graphic testimony of their ability to achieve excellence of proportion through a geometric system. The beauty and enduring appeal found in architecture, the unity and pleasing proportions discovered in paintings, and the harmony and rhythmic patterns revealed in examples of handicraft remain as evidence that the great masters relied on a geometric scheme in planning their compositions.

> Mathematics, rightly viewed possess not only truth but supreme beauty--a beauty cold and austere like that of sculpture, without appeal to any part of weaker nature, without the generous trappings of painting or music, yet sublimely pure and capable of the stern perfection such as only the greatest art can show.[3]

A little more than a century ago scholars began a search for the rules of fine proportion that they believed have been handed down from master to apprentice from the

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[3] E. T. Bell, Men of Mathematics, p. 17.

time of ancient Egypt through the European Renaissance. In the early twentieth century one of the outstanding American scholars to begin an investigation was Jay Hambidge.[4] He was one of the first theorists to go to Greece and made measurements of the ancient ruins. This capable and intellectual man had read of the principle of proportion which is a constant, and he was determined to find the underlying principles that established excellence in proportion and unity in composition. He theorized that the Greek art was applied mathematical theory rather than an inherent sense for design. Francis Cranmer Penrose, then director of the Greek department of the British Museum, encouraged Hambidge to test his theories by first-hand study.

In order to prove his theory, Hambidge spent two years in Greece.[5] Altogether he spent twenty-five years in search of further proof of his theory that the quality of order found in Greek compositions could have been made only by a careful mathematical plan.[6] He concluded that

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[4] "Jay Hambidge," Dictionary of American Biography, VIII, 165-167.

[5] Jay Hambidge, Practical Application of Dynamic Symmetry.

[6] Ibid.

the Greeks used a method of obtaining regularity, balance, and proportion in design by diagonals and reciprocals of regular areas instead of by the use of regular figures of geometry. He defined the procedure as "dynamic symmetry" (Figure 1, page 7).[7]

Lacy Davis Caskey, an American archeologist, who had also encouraged Hambidge in going to Athens to make measurements of the Parthenon and other Greek temples, was inspired by the results of Hambidge's work.[8] Caskey, as Curator of Classical Antiquities in the Boston Museum of Fine Arts, investigated the Attic black-figured and red-figured pottery.[9] He examined every piece of pottery that the museum owned which lent itself to that sort of analysis. The results of his findings were expressed by means of drawings and tables of ratios. He discovered that the outlines of each vase could be enclosed in a rectangle belonging to the system of dynamic symmetry. The interrelation of details was shown by subdivisions of the containing rectangles by intersections of diagonals. He stated that the Greek potter would have used geometry

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[7]Jay Hambidge, Dynamic Symmetry in Composition, p. 67.

[8]"Jay Hambidge," Dictionary of American Biography, op. cit.

[9]L. D. Caskey, Geometry of Greek Vases, p. vii.

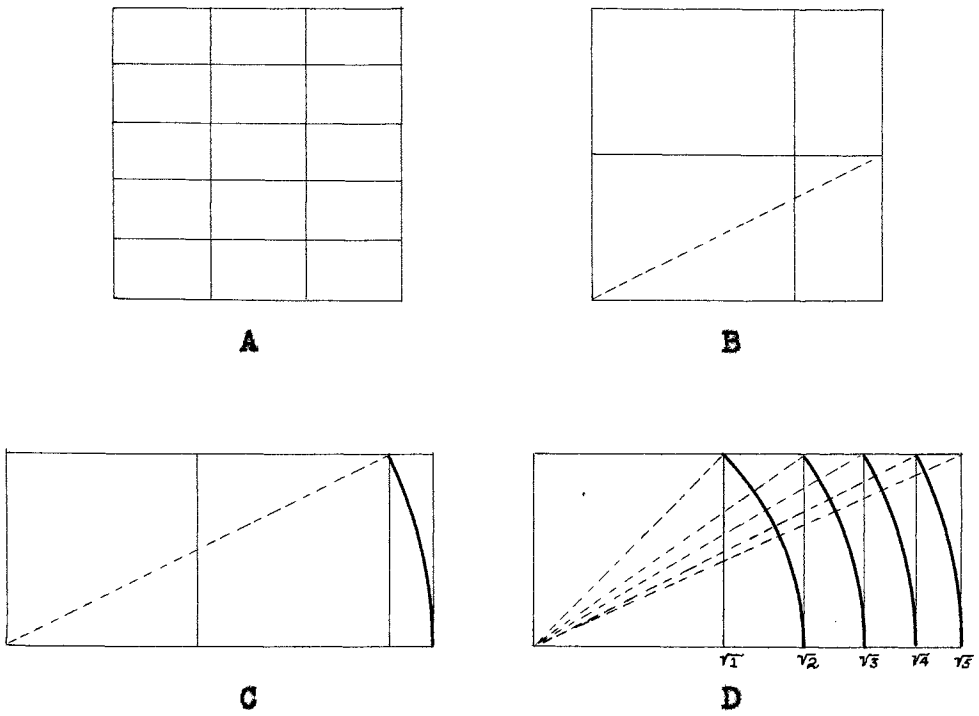

Fig. 1.--Hambidge's theory of dynamic symmetry

An area divided statically (A) results in a mesh of equal parts of an even fractional part of a unit which produces an uninteresting result from an aesthetic standpoint. An area divided dynamically (B) possesses subtlety and a balance of a higher order found persistently in natural phenomena.

The root four equals two squares. The root five equals two squares plus the difference between the sides and their diagonals. The most perfect proportions are made through dynamic symmetry, which is a law of pattern making capable of infinite variation and adaptable to every conceivable need of all art. The highest form of symmetry is based upon the diagonal of two squares and it makes no difference if the artist begins with two squares (C) or one square (D).*

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*Jay Hambidge, Dynamic Symmetry in Composition, pp. 68-73.

rather than arithmetic in achieving proportions; thus, the vast majority of vases analyzed could not be accurately expressed either in linear units or squares but could be clearly expressed in terms of rectangles derived geometrically from the square.[10]

Irma A. Richter was another scholar who endeavored to give evidence to support the belief that geometry was the basis for great works of art.[11] She undertook the task of analyzing various works of great art from ancient Egypt, Byzantium, Mediaeval Europe, the Renaissance, and the French Post-Impressionist Period.[12] She observed that there was a persistence for over 2,000 years of a certain formula called the "golden section" or the "divine section," the formula that the first part is to the second part as the second part is to the whole or sum of the two parts. She has applied the formula to masterpieces ranging from an Egyptian bas-relief to a water color by Cezanne. After making studies in Greece and analysing other works of art of the past, Richter concluded that a unity of principles among the great schools of Europe was a mathematical scheme and not a matter of coincidence.

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[10] Ibid., p. 2.

[11] Irma A. Richter, Rhythmic Form in Art.

[12] Walter Pach, "Divine Proportion," Creative Art, XII (May, 1933), 369-372.

Claude Bragdon, an architect, was interested in the geometric proportions applied to architecture from the Egyptian period through the Gothic period.[13] He analyzed living organisms and classical art, showing that there was a relationship in the geometric pattern.

Charles J. Martin, professor of Fine Arts, Teachers College, Columbia University, did some research on geometry as a basis for fine proportion.[14] He concluded that it was a fact that geometry was used in obtaining enduring and satisfying beauty in art from the earliest known cultures. He pointed out that through careful and accurate planning by geometric means, the freedom and imagination of the artist was unlimited and permitted the release of the artist's full powers. Martin encouraged students to make analytical studies of works of old masters and to construct geometric plans for work to be produced.

Matila Ghyka devoted much time to the study of geometry in the plane and in space.[15] She worked out a series of geometric designs and formulas. She applied these to beauty found in nature. She was particularly interested in flowers, marine animals, horses, and human

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[13] Claude Bragdon, Projective Ornament, The Beautiful Necessity, A Primer of Higher Space, The Frozen Fountain.

[14] Charles J. Martin, "Geometry in Art," Art Education Today (1935), 43-51.

[15] Matila Ghyka, The Geometry of Art and Life.

beings. The result of the findings she called "Geometry of Life." She proceeded to find out if there was a "Geometry of Art." She made analyses of the visual arts, beginning with a bronze mirror and a vase from Greece. She places great emphasis on architecture, using an Egyptian temple, the Parthenon, the Pantheon of Rome, the Cathedral of Milan, and the plan for "Mundaneum"--designed by LeCorbusier--as subjects for her analyses. She said that without a doubt throughout all the great periods in art, planning was a conscious process, and that knowledge of science of space and theory of proportion opens for the artist an infinite variety of choices within the realm of symphonic composition.

Theodore Cook worked in a like manner, analyzing forms in nature.[16] After analyzing structural forms found in shells and flowers, he found a geometric progression. He believed that beauty in art was most satisfying because man used geometric schemes based upon this geometric progression which was what the Greeks had called the "golden section."

G. de Vianna Kelsch made a different study of the art of Egyptian bas-reliefs and paintings of other periods.[17]

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[16]Theodore Cook, Curves of Life.

[17]G. de Vianna Kelsch, Carmon Tiburtius.

He did not attempt to make a full analysis of the underlying geometric plan but he did arrive at certain rules of composition which may be applied to classical paintings. Lines placed according to Kelsch's laws often serve as a key to the geometric analysis of a work of art.

CHAPTER II

ALBRECHT DÜRER

Biography

Albrecht Dürer[1] was born in Nuremberg, Germany, on May 21, 1471. His father was a goldsmith who wanted his son to follow the trade. As soon as the young lad had learned to read and write, the elder Dürer took the boy out of school in order to instruct him in the arts of goldsmithing. Young Albrecht showed such aptitude for drawing that his father permitted the beloved son to serve as an apprentice to Michael Wohlgemuth in the year 1486.[2] For three years he worked under the master in the spirit of the late Gothic style before the dawn of the Renaissance.[3]

In the year 1490, Dürer began his travels, as was the custom when an artist had completed his years as an apprentice. He went to Colmar to study with the greatest artist and engraver that Germany had yet produced, Martin Schongauer.[4] Schongauer had died; so Dürer studied under

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[1]"Albrecht Dürer," Encyclopaedia Britannica, VII-VIII, 13th ed., 697-703.

[2]Moses Foster Sweetser, Artist Biographies, p. 21.

[3]"Albrecht Dürer," Encyclopaedia Britannica, op. cit.

[4]Ibid.

Schongauger's brothers in 1492. Later he went to Basel to study under another brother of the engraver. Dürer was a diligent student.[5]

In 1494 he arrived in Venice during the reawakening of the classical spirit combined with modern theories of exact proportion.[6] During this excursion he met the Renaissance impulse of intellectual freedom, the spirit of science and curiosity, the eager retrospect towards the classic past and a craving after truth. The young German scholar was greatly impressed by the activities of the artists and especially the work of Mantegna. He remained for awhile studying and painting.

He returned to Nuremberg, a city of great commercial activity and a place for inventors, scientists, industrialists and artists. Jacopo de Barbari, whom Dürer had met in Venice, went to Nuremberg also to live and work as an engraver in 1500.[7] Dürer and Barbari exchanged ideas on the new science of perspective, anatomy and proportion. From Barbari, Dürer probably received the impulse to do similar drawings. A series of drawings that the German made at this time show a gradual growth in his working out ideas of a canon of human proportions. In a composition of the

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[5] Ibid.

[6] "Albrecht Dürer," Encyclopaedia Americana, Vol. IV.

[7] Encyclopaedia Britannica, op. cit.

engraving "Adam and Eve" (1504) lines similar to Barbari's were used.

Late in the autumn of 1505 Dürer returned to Venice. From his letters much is learned of his happiness and the honor and praise he received. He wrote that since his work was not according to ancient art it was not considered good.[8] But Bellini, for whom he had great admiration, had praised his work before many gentlemen. Bellini was amazed and delighted with the exquisite fineness of Dürer's work, especially in the treatment of hair, and asked the German for a brush that would do such work. Dürer selected any brush and could paint equally as well.

Before returning to Nuremberg, Dürer decided to go to Bologna to learn the secrets of perspective, but upon hearing that Mantegna had died he returned to his home. Many critics have rejoiced that Dürer's stay in Italy was shortened before he lost the quaintness and vigor that characterizes his style.[9] His work is recognized by his love of grasping facts, precision of details, and his inexhaustable variety of dramatic and graphic ability.[10] In his work there is evidence of his struggle to free himself from the stiff formal conventions of the old school and to

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[8] Sweetser, op. cit., p. 50.

[9] Ibid. [10] Encyclopaedia Britannica, op. cit.

enrich his art by conscious striving for perfection of perspective and proportion. His continuous study of old and newforms, conscientious self-criticism and his exchange of ideas with the brilliant minds developed that power for intellectual and artistic realism.

Dürer spent his declining years in writing his theory of geometry and proportion which was published in 1525. His treatise on human proportion was published shortly after his death in 1528.

Geometric Analysis of "Portrait of a Man"

In planning the painting "Portrait of a Man" (see Fig. 2) the artist apparently used the guiding lines shown in Figure 3. He apparently began with a series of fine concentric circles drawn in the golden proportion. By drawing horizontal lines at the top and bottom of the largest circle the height of the picture was determined. The median points N and N' were then established. A vertical line tangent to Circle II was drawn to the base. By using the cord FN, a measure taken from the intersection of the vertical line as it intersected Circle I to the point N, where the median line intersected the circle on the left, the artist marked off four cords. The second cord terminates at the median point M at the top of the areas, the third cord MH terminates at such a point that the fourth cord HJ is vertical and forms the right side of a rectangle. An

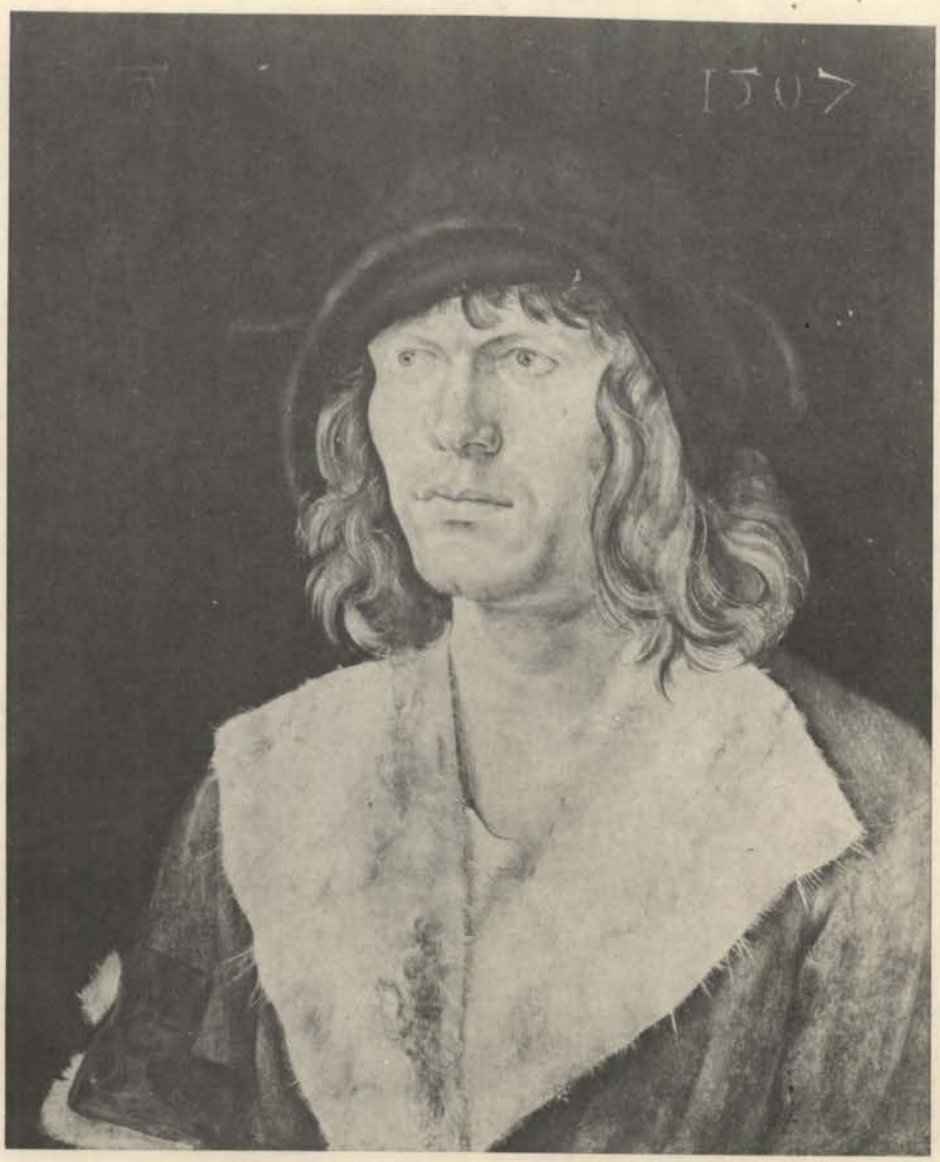

Fig. 2.--Reproduction of "A Portrait of a Man"

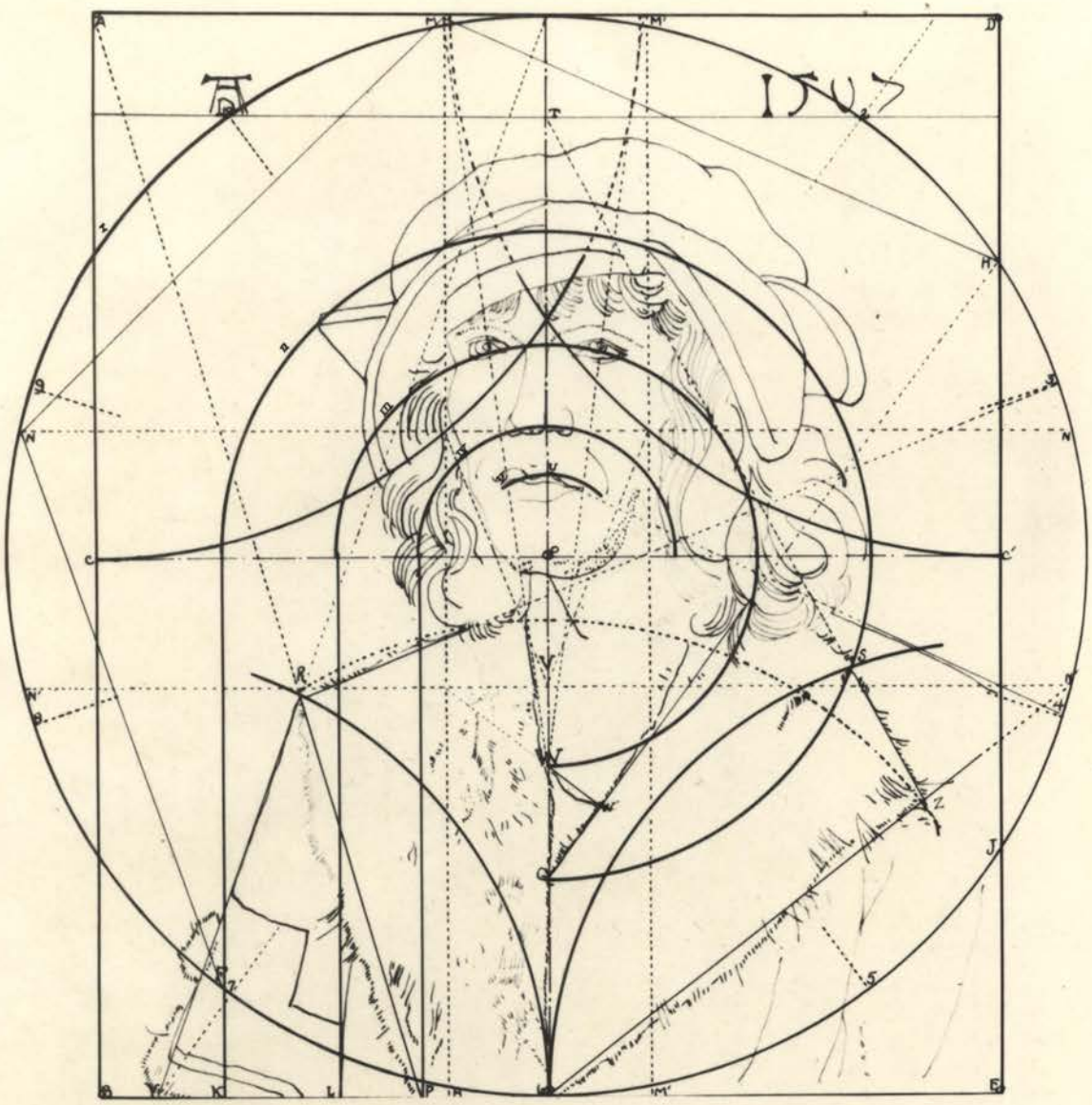

Fig. 3.--Geometric analysis of "A Portrait of a Man"

equal distance from the center of the circles was used to establish the remaining side of the rectangle.

The size of the rectangle thus established, the center lines known, the median points on the long side drawn, the painter was ready to work out other geometric proportions. The median points on the short side M and M' were constructed.

The artist's next steps were to make use of the circles he had drawn. Circle I was divided into ten equal parts which have been numbered from one to ten clock-wise. Then from Point 10 to Point 2 a horizontal line, the side of a pentagon, was drawn. The line separated the signature and the date from the portrait. Points 10 and 2 also aid in the placing of the signature and date.

Vertical lines were dropped from three of the arcs based on circles drawn in the divine proportion to the left base B6. Arc II intersects the base at K, Arc III intersects the base at L and Arc IV intersects the base at P. Each of the arcs contributes an important part in the geometric structure of the painting. Circle I was used not only to determine the size and shape of the rectangle but in locating the ten divisions to which some of the lines are drawn. It also designates the area of the light puff of fur on the sleeve on the left.

Arc II defines the area of the man's hat. The arc touches the extended brim on the left, one of the folds across the center and indicates a decisive change of direction on the right in the line of the hat. The arc ends on the center line at Q, which marks a "V" in the costume of the subject.

Arc III locates point L, which is the inside of the man's sleeve; it continues to an indentation in the bone structure of the face and locates the line on which both eyes were drawn. This arc terminates on the vertical center line at the top of the "V" in the neckline of the man's costume.

Arc IV locates P, which is used in determining the extent of the lapel on the left. The arc also is used in designating the tip of the nose. Arc V is used to establish the location of the mouth.

The artist continued the use of his compass in dividing the rectangle. Using A as a center and half of the long side as a radius, he drew an arc which aided in locating the lower edge of the hat and the cheekbone on the left and intersects Arc III at the point where the eyebrow joins the nose. With the same radius he constructed another arc, using Point D as a center. This curved line helped in establishing the inside point of the eye on the right and in placing the lock of hair on the man's forehead.

The artist continued to swing arcs across the corners. Using B as a center and half of the short side as a radius, he located the top of the shoulder at Point R. Again using the same radius and E as a center, he constructed an arc intersecting Arc II at S, which marks a change of direction in the lapel of the man's coat. With 6 as a center and a radius of 6R, an arc drawn will intersect the diagonal N'6 at Z, which fixes the area of the fur lapel on the right.

Diagonal lines were placed within the rectangle. From P to A a diagonal was constructed which locates the directional line of the lapel on the left and helps in establishing R. From 6 to the right of Arc I where the median point intersects it at N', a diagonal was drawn to locate a directional line of lapel on the right. From R a line was drawn to Point 3 on Arc I; this establishes the line of the shoulder on the left.

The vertical line through the center of the picture parallels the line of the nose, passes through the center of the chin and continues to establish the vertical line of the lapel on the left. The center line was used in determining many other lines. A diagonal from Point 1 to Y, which is a continuation of Point 7, clearly designates the sleeve area in the left section of the portrait. From T, where the side of a pentagon crosses the center, a line drawn tangent to Arc III passes through S and defines the

outer edge of the fur lapel on the right. The line terminates at Z. Another diagonal beginning on the center line on Arc V at Point U and drawn to Point 4 on Arc I locates the shoulder line in the right section of the rectangle. At V lines drawn upward toward the intersections of the median line of the long side with the two median lines of the short side enclose the lower section of the face. From W diagonals drawn to Points M and M' establish the width of the mouth and pass through the center of the eyes. By drawing a diagonal from the intersections of the median Point MM and N'N' through W on the center line, the directional line of the top of the "V" in the costume is located.

CHAPTER III

HANS HOLBEIN, THE YOUNGER

Biography

Hans Holbein, the Younger, was born in Augusburg, Germany, in 1497, twenty-six years after the birth of Dürer.[1] Holbein's father was also a painter and probably was the son's teacher. In 1515, Hans Holbein went with his older brother to Basel. There he worked as an apprentice to Hans Herbst.[2] Since Holbein was unable to find steady employment, he did many and various jobs from painting signs to painting altar pieces.[3] He illustrated books, designed stained glass windows, made initial letters for the Bible, and painted the famous portrait, "Jacob Meyer and Wife," which was a miracle of workmanship for a lad of nineteen.

Holbein went to Lucerne to paint a house, and while there he painted a portrait of the owner's son. In 1519 he returned to Basel. It is uncertain whether or not he ever went to Italy. But it was at that time the Swiss

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[1]"Hans Holbein," Encyclopaedia Britannica, XIII-XII, 13th ed., 578-579.

[2]"Hans Holbein," Encyclopaedia Britannica, XV, 14th ed., 635-637.

[3]Kenyon Cox, "Holbein," Painters and Sculptors, p. 68.

soldiers were helping the French soldiers who were fighting on Italian soil.[4] Some authorities think that Holbein might have followed the road that the soldiers took because his paintings are Italian in conception and reveal the work of an artist not unfamiliar with Italian composition. The influence of the Italians is evident in his painting in Basel Town Hall.[5] "The Last Supper," done in Basel, shows that he was acquainted with the Lombard methods. In his drawing representing the "Passion at Basel," the arrangement, the perspective, form and decorative ornament are Italian in spirit. His work in beauty of line is far finer than anything of the same sort done by Durer or any northerner.[6] The "Touch Me Not" has almost a Venetian style both in type of costume and in the simplicity of the composition.[7] His "Nativity" of Frieburg shows a similarity to Corregio's famous one at Dresden. It is a remarkable painting done by a young German, in a Swiss town, far from the art centers of the south.

When the depression came to all countries north of the Alps, Holbein went to England to earn a living. Holbein found a country that had produced no artists and whose people were not interested in landscapes or altar-pieces, but would pay well for a painting of their own

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[4] Encyclopaedia Britannica, 13th ed., op. cit.

[5] Ibid. [6] Cox, op. cit., p. 69. [7] Ibid., p. 71.

likenesses. So Holbein began to produce many portraits. He was able to return to Basel in 1628 but again he had to resort to miscellaneous designing and illustrating to earn a living. In 1531 Holbein returned to England to earn money as a portrait painter. He was an industrious painter and was accepted in the fashionable circles. He presented to King Henry VIII a portrait of Prince Edward as a Christmas present and he became attached to the court until his death in 1543.

Geometric Analysis of "Prince Edward VI as a Child"

Holbein probably began the composition for "Prince Edward VI as a Child" (Fig. 4, page 25) by drawing the square ABDE (Fig. 5, page 26). To complete the enclosing rectangle he drew two squares below the first square and added two measures marked on the base line BE on the left and one measure on the right.

The artist subdivided the original square by drawing diagonal lines AE and BD from the corners; from the center of the square he also drew the diagonal TH, H'U, UH, and HT. He then marked the base line BE into sixteenths and in some cases used half measures of that distance.

The diagonal AE passes through an angle of the boy's hat, passes through the right eye and the center of the nose. The diagonal BD begins at the center of the child's

Fig. 4.--Reproduction of "Edward VI as a Child"

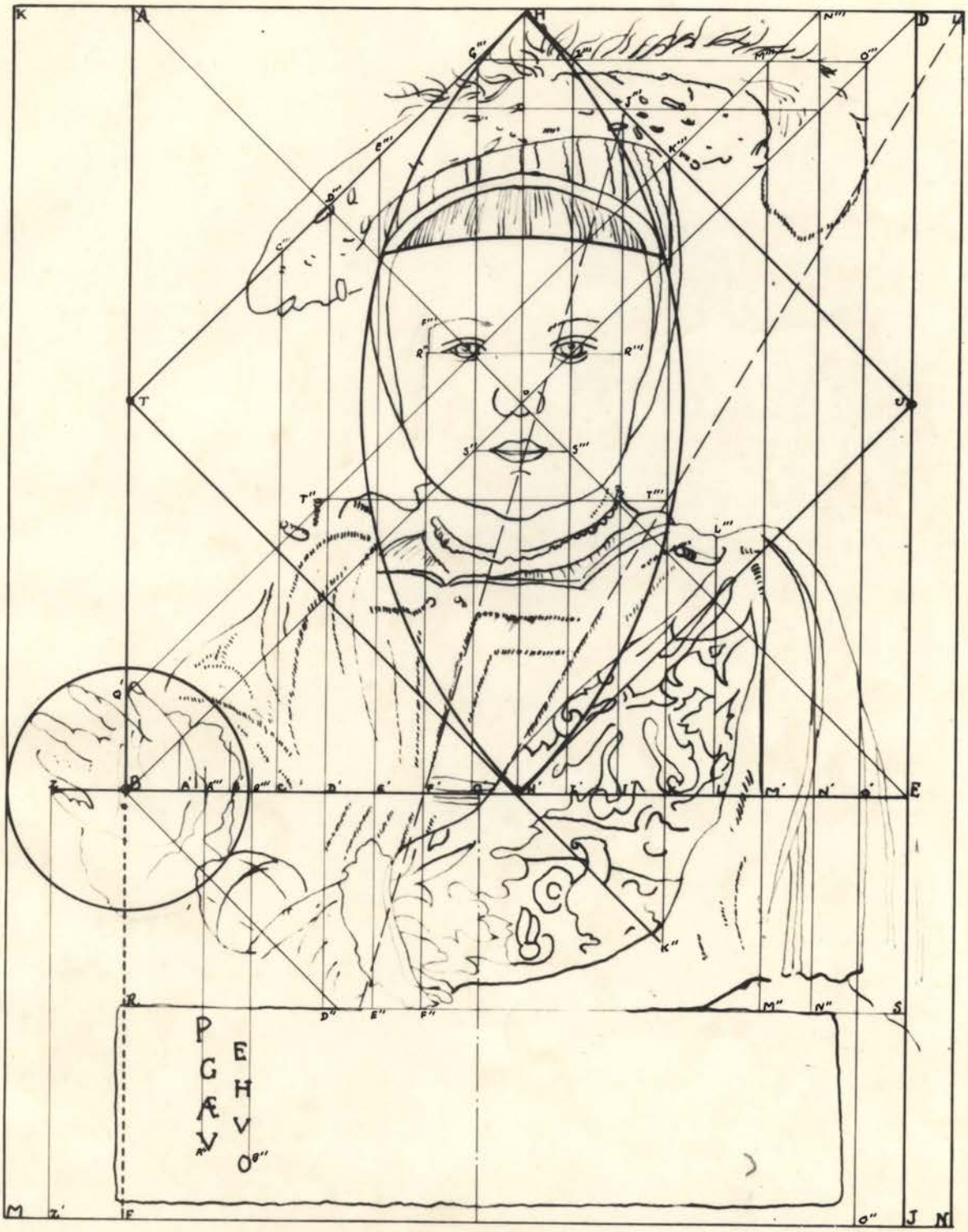

Fig. 5.--Geometric analysis of "Edward VI as a Child"

right hand, passes along a line in the costume, through the center of the nose, the center of the left eye, a corner of the hat and marks a change of direction in the line of the plume.

The artist made use of a vertical line A''A''' dropped from half the distance A'B' to establish the first line of capital letters in the text. Another line B''B''' dropped from half the distance B'C' marks the second group of capital letters. The vertical C'C'' locates the inside line of the sleeve, is tangent to the ornament on the right shoulder and terminates in an ornament on the hat brim. D''D''' is used for locating points both above and below the base line, as it marks a joint in the middle finger of the left hand, is tangent to the shoulder ornament and locates an ornament on the hat. E''E''' locates the angle where the cuff and left hand meet, bisects the upper edge of the cuff, is tangent to the right corner of the yoke and touches the corner in the hat where the crown and brim join. F''F''' locates the spot where the left cuff touches the text, marks a line in the costume and indicates the extent of the right eyebrow. G''G''' marks a terminal point of one of the stripes in the costume, passes through the right eye and terminates at a point that makes the horizontal axis for the plume. H'H bisects the child's face, passing through the middle of the chin, mouth and nose. I'I''' touches the end of a horizontal

stripe in the costume and passes through the center of the left eye. J'J''' locates the outer edge of the ruffle around the neck and terminates on the diagonal HU which marks a point to be used in establishing the diagonal J'''F''. K''K''' touches the left side of the headdress, marks the angle made by the hat and brim and below the base line joins the continuation of the diagonal TH' to establish the elbow. L'L''' shows the indentation in the left shoulder. M''M''' marks one of the folds in the child's cape and points to the edge of the left brim. N''N''' designates another fold in the cape, determines the axis of the plume as it drops from the hat brim and marks a point on AD from which the diagonal N'''Q' was drawn. O''O''' marks another fold in the cape, marks the outer edge of the plume and meets the diagonal BD which establishes the horizontal line indicating the axis of the plume.

Holbein used the common measure, a sixteenth of BE, in establishing the horizontal lines for the eyes and mouth from the center point O. With the same measure he drew another horizontal line which indicates the height of the right shoulder. The lower squares were divided in halves horizontally to determine the height of the text.

The diagonal N'''Q drawn from the intersection of N''' with AD to the line AB passes through the right eye, the decoration on the left shoulder and ends at the tip of the

right thumb. The diagonal drawn from the intersection of J''' with the diagonal HU through F' on the base BE passes through the left eye, the left side of the nose, along a major stripe in the costume and ends at the lower edge of the prince's left hand. A diagonal drawn from L through R'' marks a diagonal stripe in the blouse, passes at the corner of the belt and terminates at the lower edge of the left hand.

Holbein probably used the compass in enclosing the area of the child's face. With T as a center and TH as a radius an arc was drawn from H to H'. With U as a center and with the same radius another arc was drawn from H to H'. With H' as a center and with the same radius the artist connected the two arcs and established the hair line S'3''. A circle with B as the center and BB' as the radius was used to enclose the right hand and cuff.

CHAPTER IV

LUCAS CRANACH, THE ELDER

Biography

Lucas Cranach was born in Cronach in Upper Franconia in 1472.[1] Little is known about the painter, who made wood and copper engravings and drawings for the dies of the electoral mint until about 1504. At that time his realistic still-life paintings attracted the attention of the duke, who fostered his talent.[2] He painted pictures of wild life, and later, pictures of the duke running the stag or sticking the wild boar. Under Duke John and Frederick-The-Wise, he enjoyed a prosperous position as a court painter.

Cranach took much interest in political affairs and served as burgomaster of Wittenberg twice.[3]

He was much interested in the religious group of reformers working with Martin Luther.[4] It was Cranach who painted the reformers with such detail that their likenesses have been preserved. The religious influence of

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[1] "Lucas Cranach," Encyclopaedia Britannica, VII-VIII, 13th ed., 364-365.

[2] Ibid.

[3] Ibid.

[4] "Lucas Cranach," Encyclopaedia Britannica, VI, 14th ed., 632-633.

the reformers is evident in his many altarpieces. Durer was one who competed with Cranach as a painter for the Schlosskirche at Wittenberg in 1508. Cranach succeeded in getting the commission.

Cranach is known chiefly as a portrait painter and founder of the Saxon School.[5] He was very popular with the German people. He evidently had some mechanical means for reproducing portraits as there is a record of his receiving payment in one day for sixty pairs of portraits of the elector and his brother done in Wittenberg in 1533.[6]

Critics have said that though he excelled in portraiture his portraits lacked strength and spirit; though he was a master of detail he was not a composer.[7]

Geometric Analysis of "A Princess of Saxony"

Lucas Cranach, in planning the painting "A Princess of Saxony" (Fig. 6, p. 32) probably began with the area ABDE (Fig. 7, p. 33) which was divided into twelve squares. To complete the enclosing rectangle ABFG, he added the space DFEG on the right equal to one fourth of a square in width.

Cranach concentrated his greatest effort within the central area of the original rectangle. The four squares

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[5] "Lucas Cranach," Encyclopaedia Americana, VIII, 153.

[6] Encyclopaedia Britannica, 14th ed., op. cit.

[7] Encyclopaedia Americana, op. cit., p. 153.

Fig. 6.--Reproduction of "A Princess of Saxony"

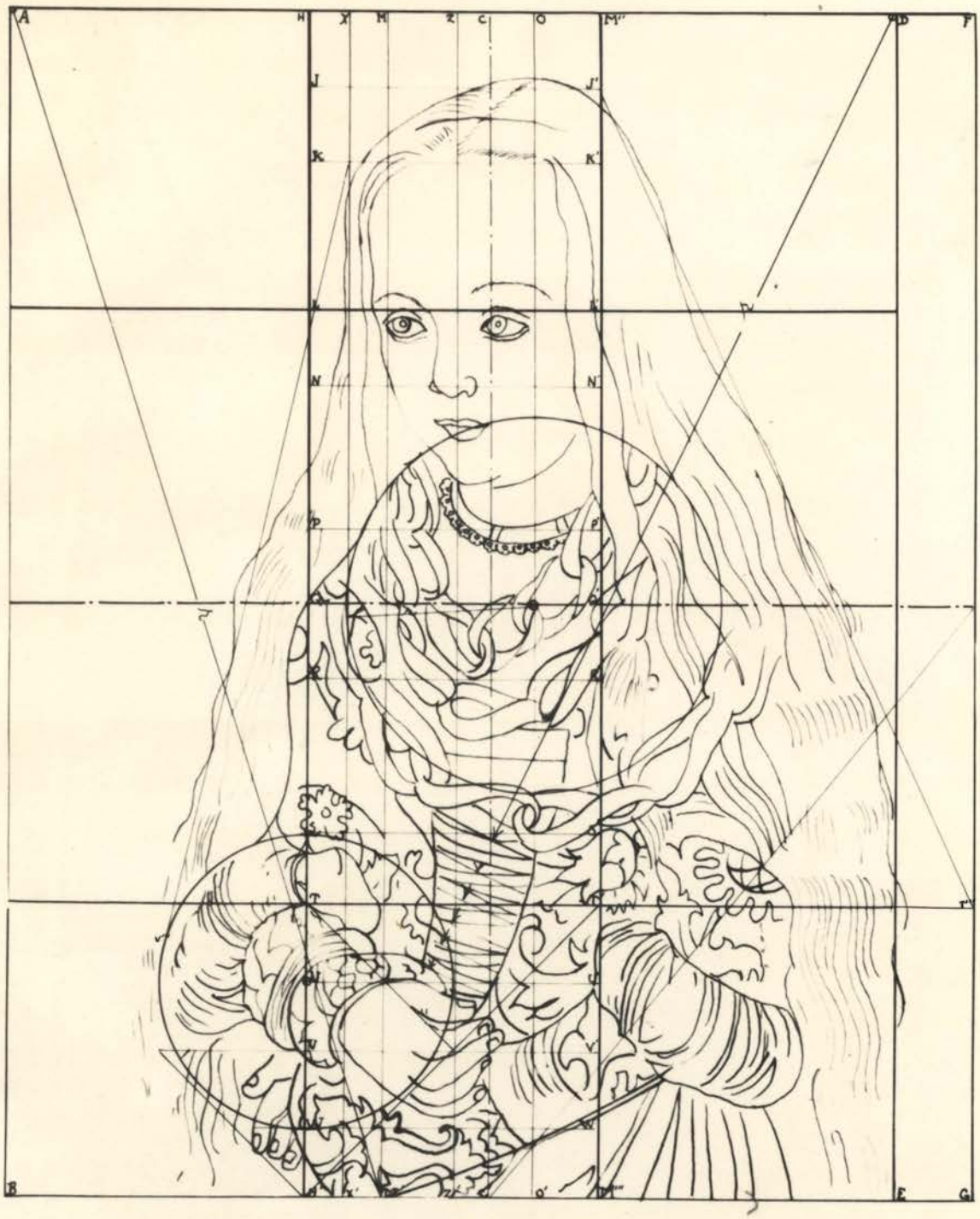

Fig. 7.--Geometric analysis of "A Princess of Saxony"

bounded by HH' and M''M''' were divided into fourths vertically and in some cases horizontally. These subdivisions were used in locating canonical points of the princess and in establishing points of interest in the costume.

In the square HL', JJ', which is one fourth of the horizontal division of the square, establishes the top of the princess's head. KK', which bisects the square, designates the hair line and the part in the hair begins at the center point. The base of the square, line LL', is tangent to both eyelids. NN', which is one fourth of the square QL' passes through the base of the nose. PP', another equal measure of the square, is tangent to the top of the necklace. QQ' is the center of the long side and passes through points in the first loop of chains and locates the top of the bodice. RR' establishes the lower edge of the stripe in the "V" of the bodice. TT' is a divisional line of one of the squares and locates a point in the puff of the right sleeve. UU' is tangent to the top of the right hand. The line VV' establishes the position of the index and the middle finger.

XX', a vertical which is one eighth of a square, establishes the line of hair as it falls on the right side, touches the point where the hair and necklace meet and is tangent to the sleeve line of the left hand.

MM', which is the median line of the short side, touches the outside edge of the right eye and touches a

vertical directional line of the necklace as it falls from the neck. ZZ', which is the vertical center of ABDF, goes through the center of the forehead, through the nose and mouth, coincides with the inside line of the necklace, bisects the thumb nail, and passes through joints in the right hand. CC', which is the center of the short side, passes through the left eye, through an indentation of the chin line, and through the right middle finger nail. OO' is tangent to the outside of the left eye and intersects with QQ' to make the center of a circle with a radius equal to the distance from OO' to XX'. The circle passes through the mouth and establishes the directional line for the largest loop of chains.

Cranach made further use of the compasses in establishing the lines of the lacings. The center of the series of arcs is D. With A as a center and a radius AM, he constructed another arc which cuts WW' and OO', thereby locating the lower left sleeve. With U as a center and radius tangent to the diagonal, he described a circle enclosing the puff of the right sleeve, passing through divisions in the right hand.

The artist employed diagonals for enclosing the flowing tresses of themaiden. From K''' to the circumference of the circle in the square BT, the diagonal K'''V''' establishes the directional line of the hair on the

princess's right. The left side of the hair was painted with the aid of a line drawn from J, a point on FG at the intersection with TT''. A diagonal from the center of the square BT to H' encloses the fingers of the left hand.

Geometric Analysis of "A Prince of Saxony"

Lucas Cranach probably constructed the enclosing rectangle for "A Prince of Saxony" (Fig. 8, p. 37) by drawing twenty squares (Fig. 9, p. 38). To determine canonical points and establish the lines of the costume the squares were subdivided in halves, fourths, or eights.

The horizontal lines determine the placing of the following points of interest:

NN'', which falls at the center of the squares JC and CL, determines the top of the head;

JL, which is the base of the square JC and CL, passes at the top of the circle of jewels in the headdress on the child's right;

OO'', which is equal to one fourth of a square, determines the line of the eyebrows;

PP'', which is equal to one eighth of a square, passes through the centers of the eyes;

QQ'', which is equal to five eights of a square, passes through the base of the nose;

Fig. 8.--Reproduction of "A Prince of Saxony"

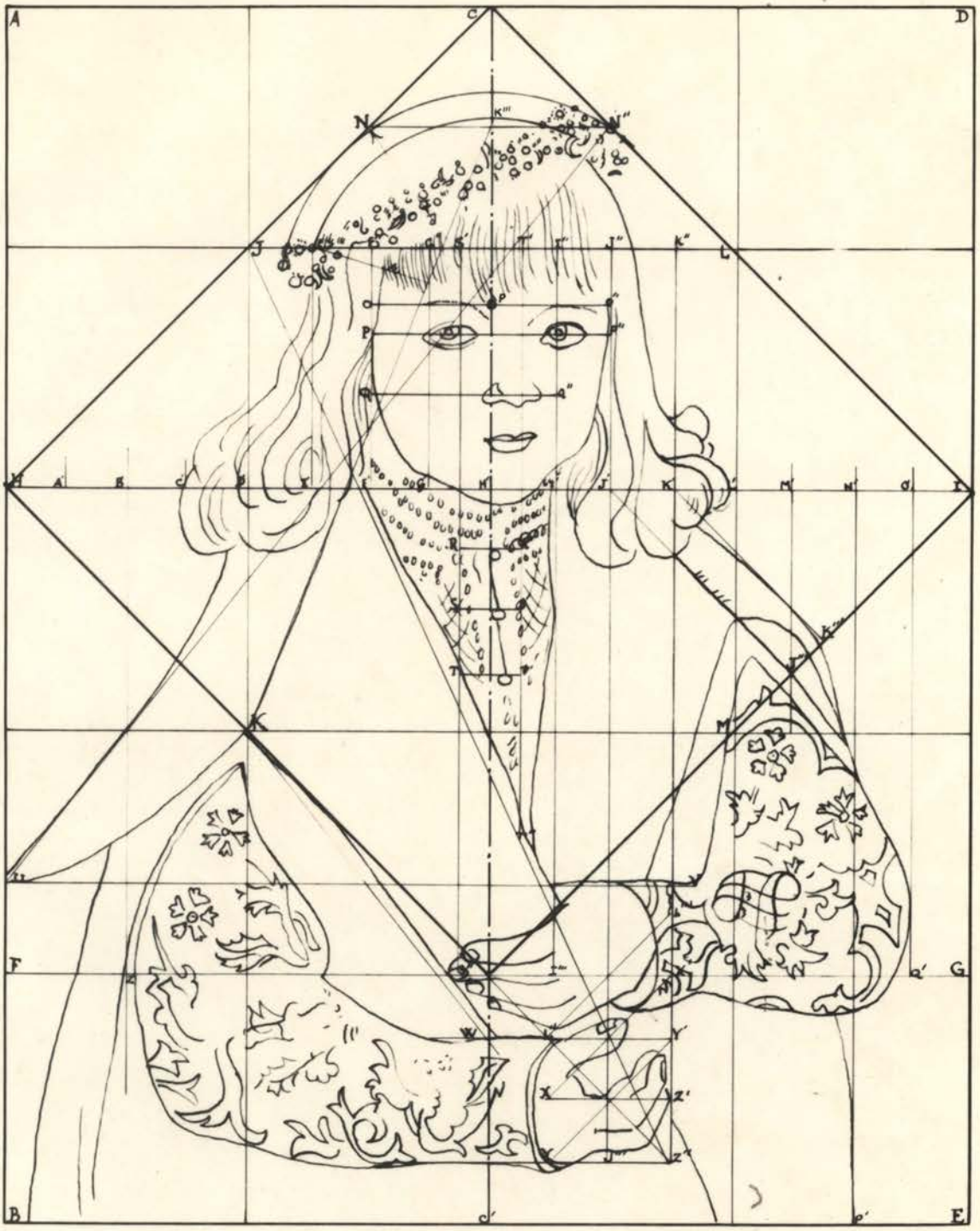

Fig. 9.--Geometric analysis of "A Prince of Saxony"

HI, which is the base of the second row of squares, passes through the widest fluff of hair on each side of the child and marks the curve of the chin;

RR', SS' and TT', which are drawn as one fourth of a square intervals, locate the buttons on the ornate blouse of the child;

UV, which is drawn five eighths of a square, locates the tip of the collar as it falls at the child's back and also establishes the horizontal made by the child's left hand and lower left arm;

FG, which marks another divisional line of the twenty squares, passes through the right elbow and through the middle finger of the left hand;

WY', which is equal to one fourth of a square, establishes the upper line of the right wrist and goes through the center of the right thumb;

XZ', which is equal to one fourth of a square, establishes the line of the right palm;

YZ'', which is equal to one fourth of a square, determines the lower edge of the right sleeve and hand;

The vertical lines determine the placing of the following points of interest:

B'Z, which is equal to one half of a square, is drawn to indicate the back edge of the upper right sleeve;

E''E', which is drawn through the center of a square, determines the line of the right cheek;

G''G', which is drawn equal to one fourth of a square, passes at the outer edge of the right eye;

S'S'' is tangent to the pupil of the right eye and terminates at the center of the nail of the left middle finger;

CC', which is the center of the enclosing rectangle, is tangent to the right eyebrow, passes through the right nostril, the corner of the mouth, bisects the first button and passes through the joints of the left fingers;

T''T''' passes through the center line of the nose and mouth and ends at the center line of the blouse as it meets the line of the coat;

I''I''', which is equal to one fourth of a square, passes through the left pupil, determines the left neck-line of the coat and locates the point where the thumb disappears under the fold in the coat;

J''J''', which is drawn through the centers of squares, determines the line of the left cheek, passes through the center of the right thumb nail and establishes the line of the finger as they join the right palm;

K''Z'', which is equal to one fourth of a square, touches the point where the left shoulder seam reaches the hair and encloses the fold of the right fingers;

LM, which is a divisional line of the twenty squares, is tangent to the fluff of hair on the Prince's left and establishes the extent of the left shoulder seam;

N'P', which is drawn at one half of a square, establishes the folds on the upper left sleeve and the line of the coat as it reaches the base line;

O'Q', which is drawn equal to one fourth of a square, determines the left elbow.

The diagonals determine the placing of the following points of interest:

N''U establishes the directional line at the back of the coat and passes through the right pupil;

NN''CC'KK'' locates the seam of the right shoulder line in the coat;

JZ'' determines the right neckline of the coat;

K'K''' establishes the line of the left shoulder;

XX' establishes the line of the right thumb.

Arcs were used to determine other points of interest:

With P as a center and a radius to E'' the artist used an arc to determine the curve of the child's head;

With the same center and a radius extended to N another arc was drawn to determine the line of the headdress.

CHAPTER V

CONCLUSION

The Work of Albrecht Dürer

In order to make this investigation more valid, the writer analyzed for comparison the "Madonna and Child with Saint Anne" (Fig. 10, p. 43), which was painted by Dürer in 1519. The writer has searched for similarities in this authentic painting by Dürer and the National Gallery painting, "Portrait of a Man" (Fig. 2, p. 16), which is attributed to him. The enclosing rectangle in each painting is based upon the diameter of Circle I. In each case the artist has made use of concentric circles drawn in the "divine proportion" as a foundation for the composition. Perpendiculars dropped from the circumferences of the smaller circles to the left base lines serve as structural lines in the compositions.

In each painting arcs with centers at corners of the rectangle and with radii equal to half the long side have been used structurally to maintain unity and rhythm. The arcs in "Portrait of a Man" coincide at the median lines of the short side and pass through the inside corners of both eyes of the figure. In "Madonna and Child with Saint Anne" arcs of the same proportion coincide at the median

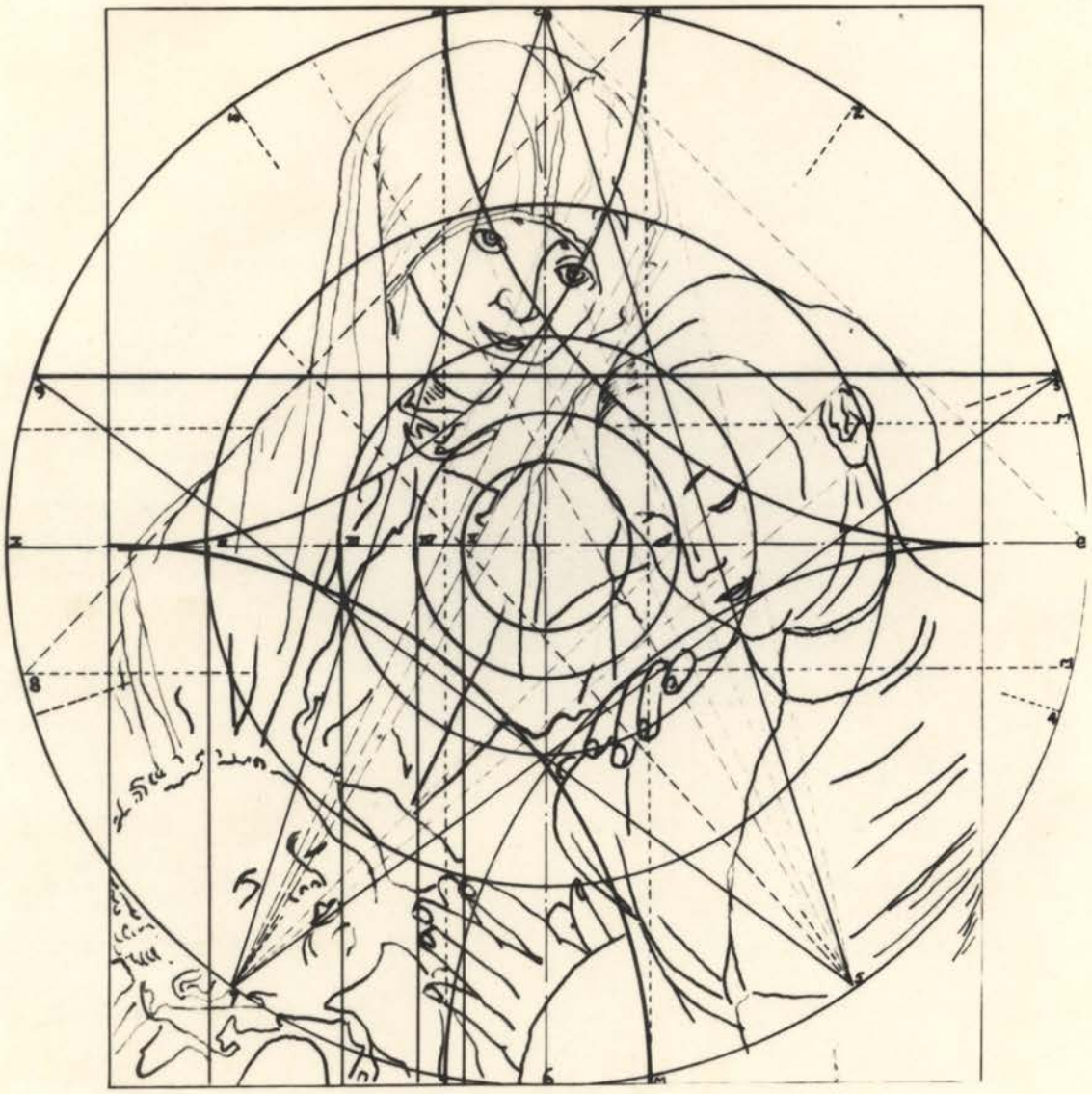

Fig. 10.--Geometric analysis of "Madonna and Child with Saint Anne."

lines and locate both eyes of Saint Anne, and one of the arcs also passes through the left eye of the Madonna.

It is also interesting to note that the proportions of the enclosing rectangles of the two paintings are identical.

The "Portrait of a Man" is dated 1507, shortly after Dürer's return from Italy. Dürer was a student of the Italian Renaissance and was in close association with Givonni Bellini. Each artist had great respect and admiration for the work of the other. For that reason the reproduction of the altarpiece painted by Givonni Bellini and analyzed by Richter has been introduced (Fig. 11, p. 45).[1]

In Richter's analysis it is noted that the Italian based his composition upon five concentric circles with diameters related in the "divine proportion." Since the altarpiece was painted in 1488, it is possible that Dürer studied it during his two visits to Italy. If Dürer was not influenced by this particular work, it is likely that other works of Bellini based on the same plan influenced Dürer to try the same method in obtaining rhythm, harmony, unity, and beauty of proportion.

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[1] Irma A. Richter, Rhythmic Form in Art, Plate XXV.

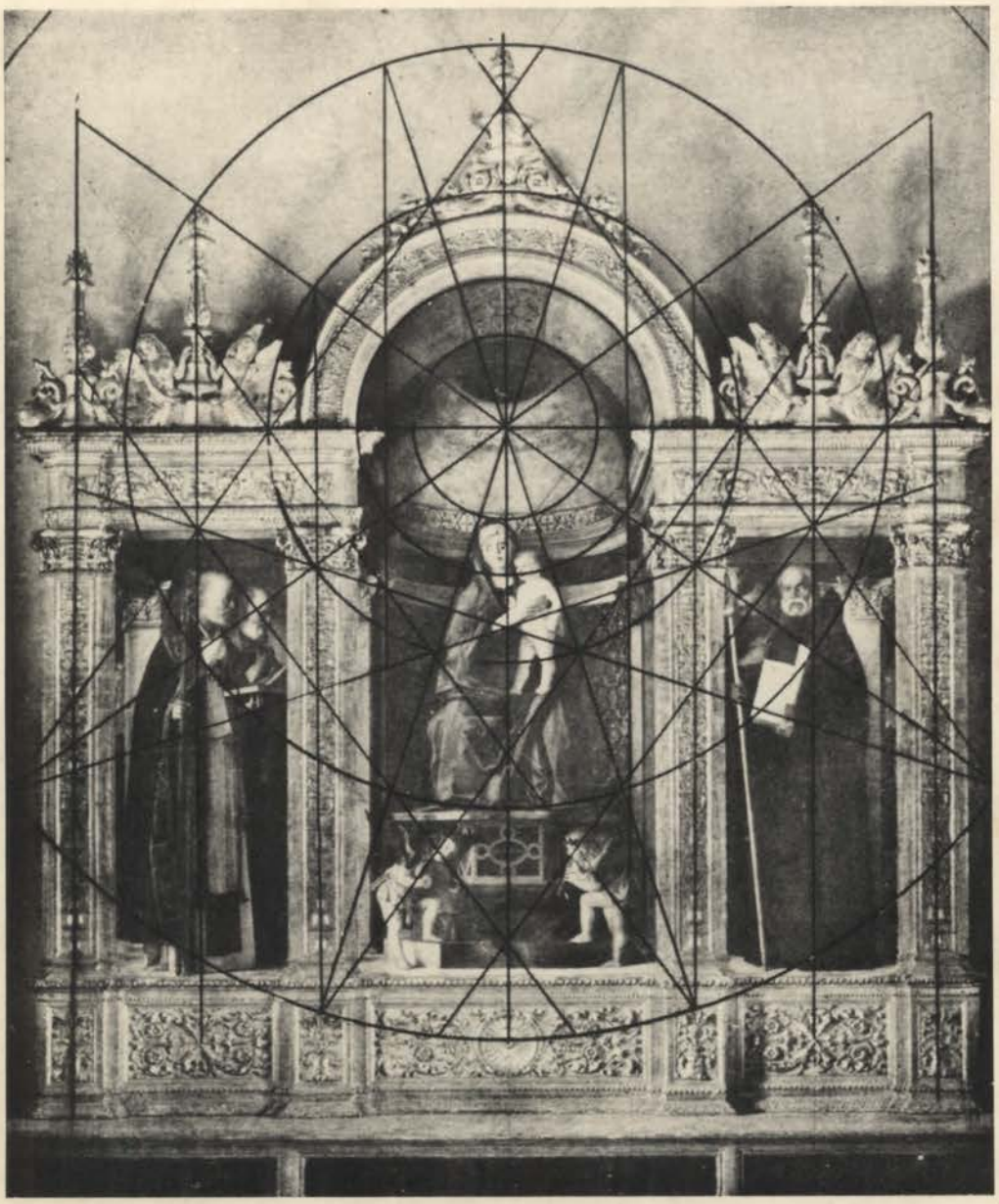

Fig. 11.--Geometric analysis of Bellini's altarpiece by Richter.

The author does not wish to state that the analysis she made of "Portrait of a Man" is the only plan that the artist could have followed in creating the portrait, but the suggested plan seems to be the logical basis of the composition. Neither would the writer like to conclude upon the basis of this analysis that "Portrait of a Man" is the work of Albrecht Dürer. Even experts have hesitated to make that statement; but the writer does conclude that the compositional arrangement is similar to that used in another painting by Dürer and that such arrangement could be made only by one who had studied with the Italian masters or who had been influenced by the geometric plans of the Italian Renaissance paintings.[2]

The Work of Hans Holbein, the Younger

Since the writer was able to study only one painting by Holbein in the National Gallery, she analyzed another painting by the same artist in order to make the conclusions more valid. The self-portrait of Holbein (Fig. 12, p. 47) was done in England in 1542, just a year before the artist died in London.

The composition is a very simple arrangement of squares and their diagonals. Holbein based his self portrait on

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[2] Portrait of a Man by Albrecht Durer, Folio in the Office of the Curator of the National Gallery of Art.

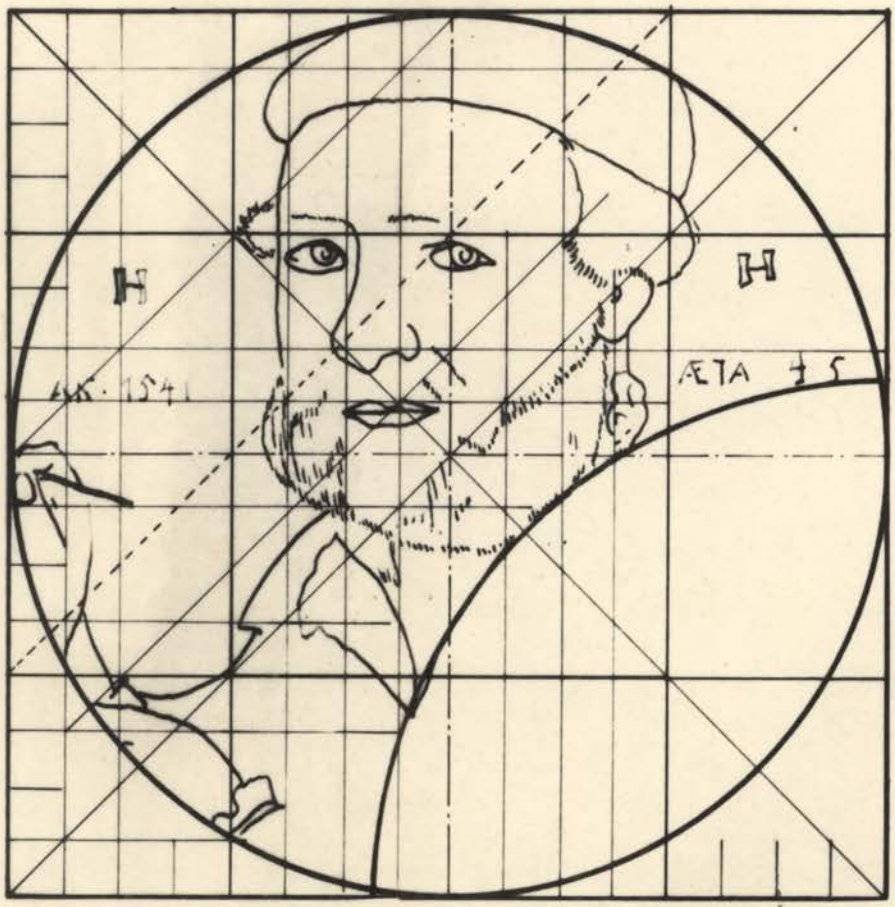

Fig. 12.--Geometric analysis of Holbein's self portrait.

squares and equal divisions of those squares: horizontal, vertical or diagonal. Critics have noted that as Holbein became older his style grew more primitive.

The author believes that the primitive style or static composition found in Holbein's later work might be attributed to several causes. He was painting in England, which is far from Italy and the influence of the Renaissance painters. The English people did little to encourage an artist beyond being willing to sit for a portrait and pay for it. Since the depression had driven Holbein to England, he had not alternative but to produce portraits. He painted many until he was able to return to his wife and family in Basle. Even though upon his return he was wearing silks and satins and he had plenty of money, he found that he had to earn a living by returning to painting.

Again Holbein was forced to go to England, but he now found that times had changed. He found many of his patrons among the merchant class. In order to support his family in Basle, it was necessary also to win the recognition and favor of the Court and this compelled Holbein to paint many more portraits. Perhaps to expedite the work he resorted to the simple geometric schemes based upon squares. He may have planned his compositions on graph paper or had an assistant divide his canvases into squares.

The reason for Holbein's return to a primitive or static means of balance cannot be definitely determined, but it is known that he produced eighty-seven portraits for Windsor Castle and approximately that number for outsiders. It is also known that through his paintings he found favor with King Henry VIII, who said: "I could make six peers out of six ploughmen, but out of six peers I could not make one Holbein." Holbein's regard for King Henry was expressed in the portrait of the King's son, "Edward VI as Prince of Wales" (Fig. 5, p. 26), which bears a Latin inscription:

> Little one, emulate your father and be heir to the virtue of him whose peer the world does not contain. Heaven and nature could hardly produce a son who could surpass in glory such a father. Do but match in full your parent's deeds and men can ask no more. Should you surpass him, you will have outstripped all the kings the world has ever revered in ages past.[3]

The Work of Lucas Cranach, the Elder

There is little information concerning the educational background of Lucas Cranach. It is known that he had some talent and was encouraged by the duke to paint. The artist probably composed his paintings in the traditional way by using squares and equal divisions of them. There surely was no reason for him to change since his work was quite popular with the German people.

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[3]"The German Masters," Masterpieces, I, 76-78.

Since Cranach enjoyed the prosperous position as court painter, the important office as burgomaster, the continual admiration of the German people, and the respected founder of the Saxon School of painters, there was no necessity for him to search elsewhere for more patrons, larger income, more prestige or newer methods. He was not forced to paint, to experiment, or to study, which probably resulted in a state of complacency for the artist.

In the two paintings by Cranach which were analyzed by the author, it seems that the artist based his compositions upon squares and simple divisions thereof.

The writer's objective in this investigation was to determine whether or not the plans for compositional arrangement as used by the German Renaissance painters were less complicated than those of their Italian contemporaries. This study has revealed some evidence of a simpler geometric plan in the work of Holbein and Cranach. These two Germans seemed to prefer the old method of using squares and their subdivisions, which resulted in "static" symmetry.

Dürer, who came under the direct influence of the Italians, and who was a diligent student and a continuous experimentor, cannot be classed with his German contemporaries. Unlike Holbein and Cranach, Dürer became familiar with and used the geometric structure which the Italians used as the result of their study of classic Greek composition;

that is, both Dürer and the Italian Renaissance artists employed in their paintings the symmetry, rhythm and harmony released by the geometric series called the "divine proportion."

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