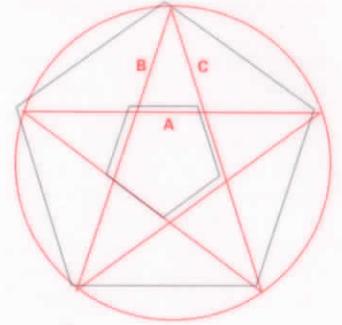


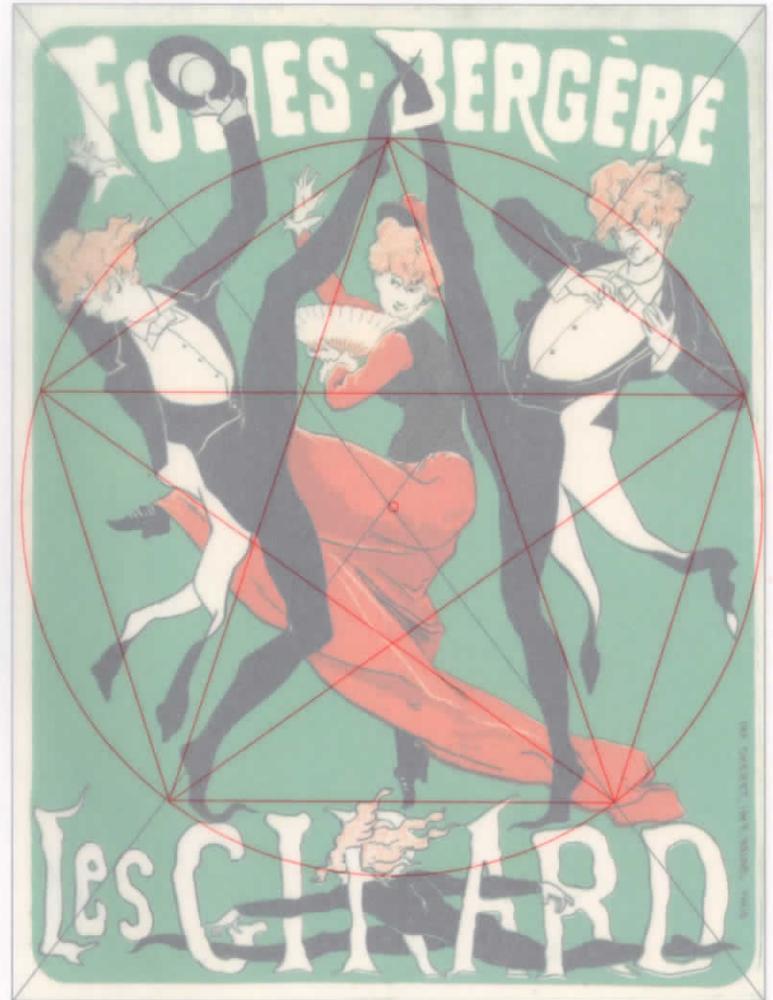
The Star Pentagram

The subdivisions of the pentagon create an interior star whose center is a pentagram. The golden section is present in that the triangles have two equal sides, B or C, that relate to the third side, A, as 1:1.618, the golden section ratio.



Analysis

The three figures are embraced first by a circle, then by a pentagon, next by a star pentagram and finally by a pentagon, with the center as a pivot point from the female dancer's hip. Even the small effin figure at the bottom plays into this structure as the head meets the circle and pentagon. (below) The triangle created by the dancers legs is a golden section triangle.



Folies-Bergère Poster, Jules Chéret, 1877

Folies-Bergère by Jules Chéret is an engaging and dynamic work that captures the movement of a group of dancers. At first glance the composition appears spontaneous and without geometric organization but closer examination reveals a very carefully developed visual structure. The positions of the dancers limbs closely correspond to a pentagon embraced by a circle.

The interior subdivisions of the pentagon create star pentagrams which in turn create a smaller proportional

pentagon. The ratio of the sides of the triangles within a star pentagram is 1: 1.618, the golden section ratio. The exact center of the poster is a pivot point on the female dancer's hip, and the legs of the male dancers create an inverted triangle, the top point of the pentagram star, that embraces the female dancer. Each limb and shoulder is carefully positioned according to the geometry of the structure.

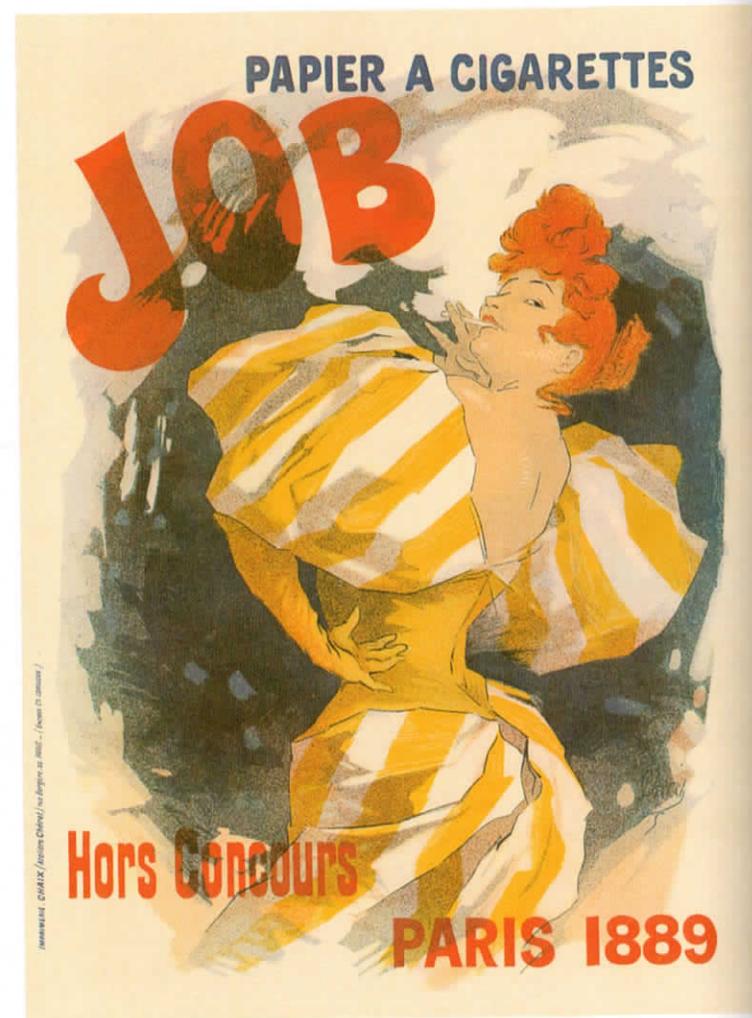


Job Poster, Jules Chéret, 1889

Chéret was a master lithographer and is credited with elevating the chromolithography printing process to an art form. His knowledge of chromolithography printing grew from an apprenticeship begun at age 13. The only formal education he received in art and design was a course at the École Nationale de Dessin, National School of Design. It is perhaps in this course that he was introduced to geometry and the principles of composition. Although his formal education was limited, throughout his career he made the major art muse-

ums of Europe his personal schools and carefully studied the works of the masters.

Many of Chéret's posters were instant successes because of the beautiful play in color and the delightful illustrated figures. He understood the chromolithographic printing process and used it to his advantage. He also understood the principles of composition and used them to unify this and many other works.



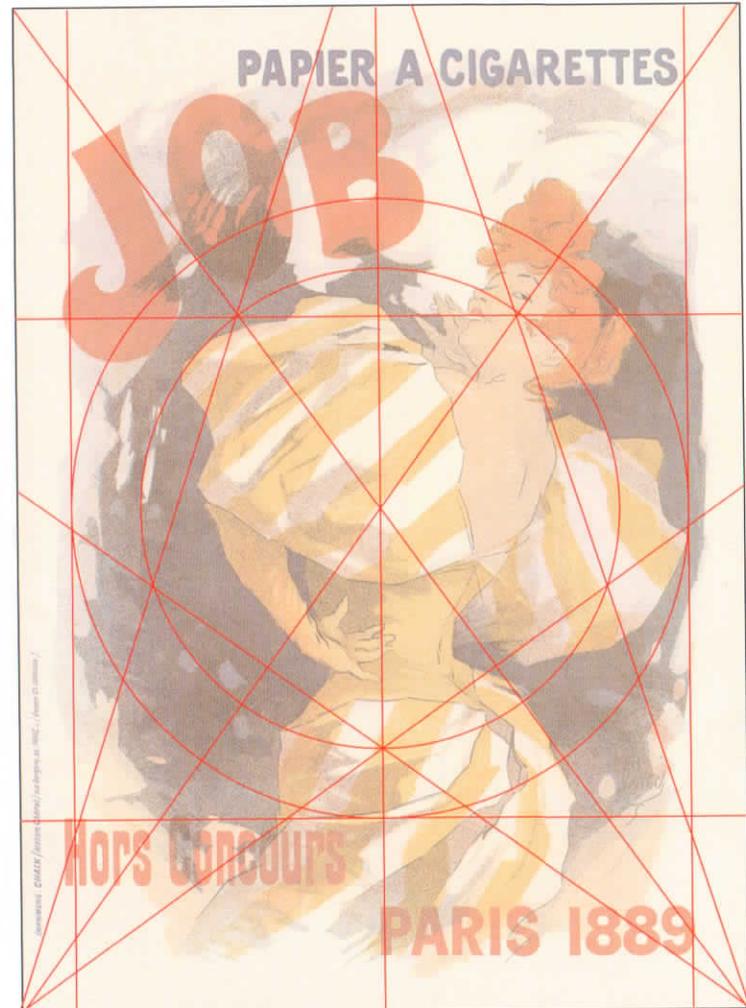
The Star Pentagram and Format Proportion

Expanding the star pentagram inscribed in a circle reveals that the poster format proportions are based on this system known as the "pentagon page." The base of the poster conforms to the bottom side of the pentagram and is extended so that the top corners meet the circle.



Analysis

A circle with its center at the center of the page governs the placement of the figure and the type, "JOB." The upper right to lower left diagonal visually organizes the placement of the head, eye, and hand. The upper left to lower right diagonal flows through the shoulder and past the hip.



Bauhaus Ausstellung Poster, Fritz Schleifer, 1922

Fritz Schleifer celebrated the tenants of Constructivism in his 1922, *Bauhaus Ausstellung* (Bauhaus Exhibition) poster. As per the Constructivist ideals of the time, the human profile and the typography are abstracted into simple geometric shapes of the mechanical machine age.

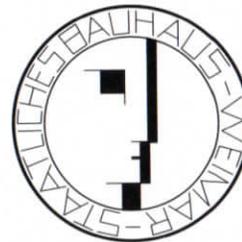
The geometric face, originally designed as part of a Bauhaus seal by Oskar Schlemmer, is further reduced from Schlemmer's original to five simple rec-

tangular shapes by eliminating the fine horizontal and vertical lines. The width of the smallest rectangle, the mouth, is the module of measure for the width of the other rectangles.

The typography is designed to be consistent with the same rectangular elements as the face. It echoes the rigid angular forms. The typeface is similar to an original face designed by Théo van Doesburg in 1920.

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Bauhaus Seal, Oskar Schlemmer, 1922



Type Design

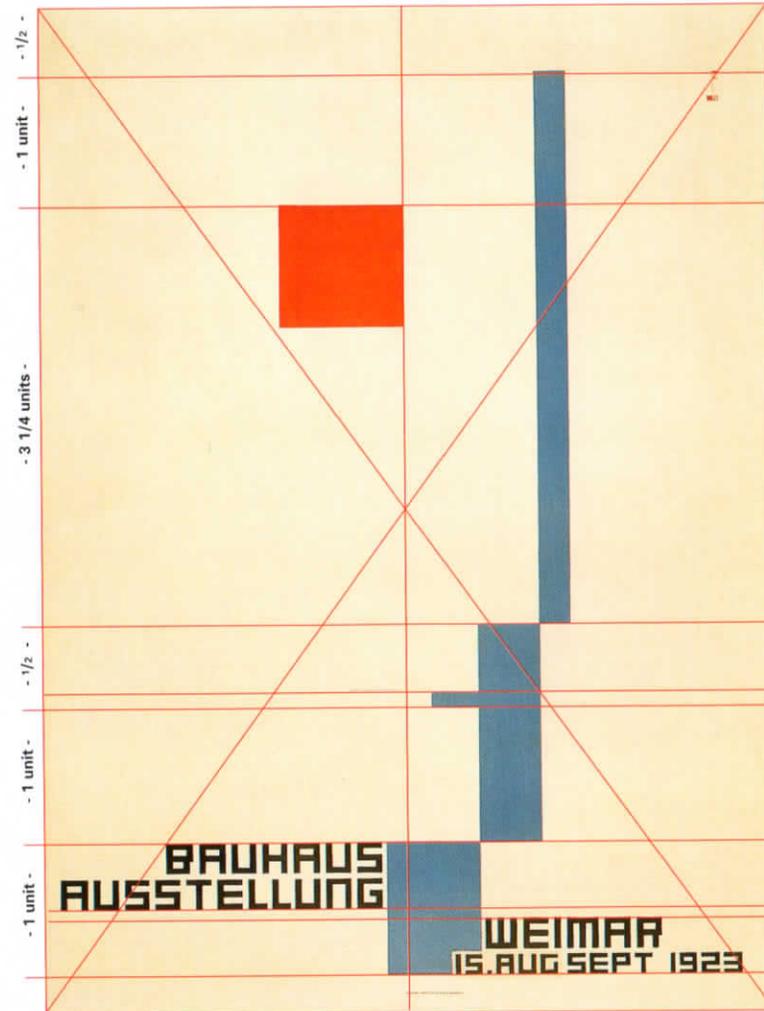
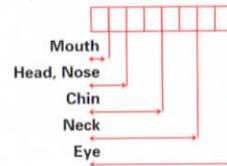
The type structure is based on a 5 unit by 5 unit square, which permits the widest characters, M and W, to occupy a full square with each stroke and counterform occupying a unit. The narrower characters occupy a 5 X 4 portion of the square, again with each stroke occupying a unit and the counterforms enlarged to two units. The B and R deviate in that a concession of 1/2 unit is made to the rounded forms and to distinguish the R from the A and the B from the number 8.



Analysis

The eye aligns along the center vertical axis. The other facial elements are placed in asymmetric relationship to this axis. The type aligns top and bottom with the neck rectangle.

Rectangle Width Proportion



L'Intransigéant Poster, A. M. Cassandre, 1925

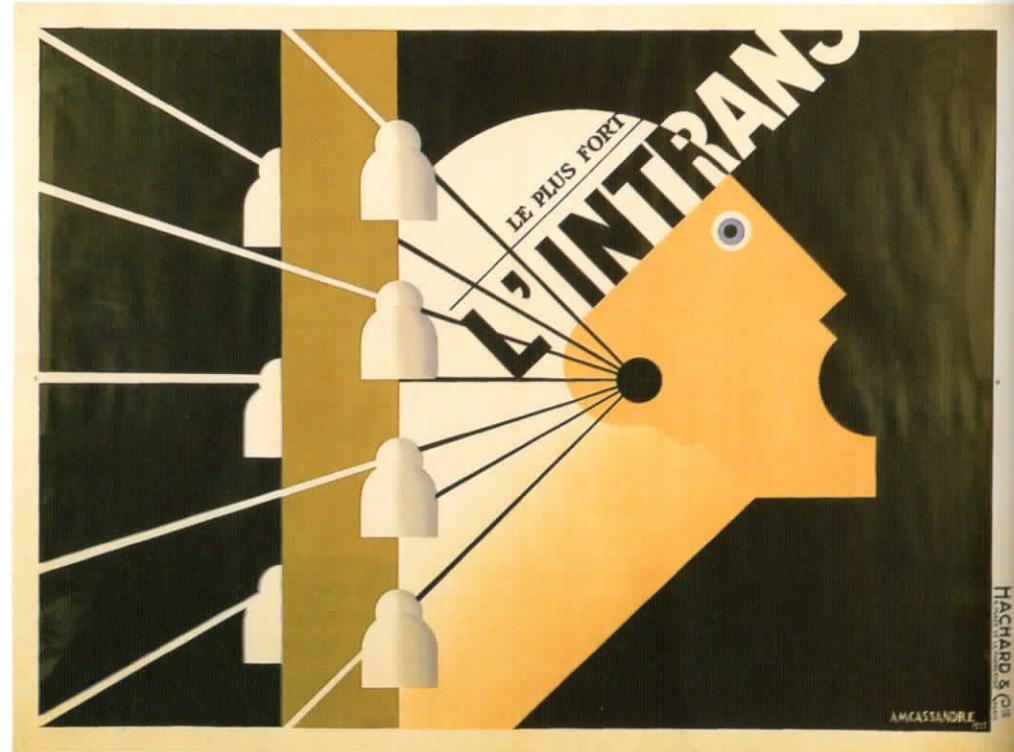
"The mathematically expressed module can only act to confirm a spontaneous insight. The golden rule merely defines the ideal proportion previously intuited by the artist; it is a means of verifying, not a system (it would be doomed [if it were], like every system)."

Diary, Adolphe Mouron, 1960

The *L'Intransigéant* poster designed in 1925 by Adolphe Mouron, who was more widely known as A. M. Cassandre, is both a conceptual triumph and a

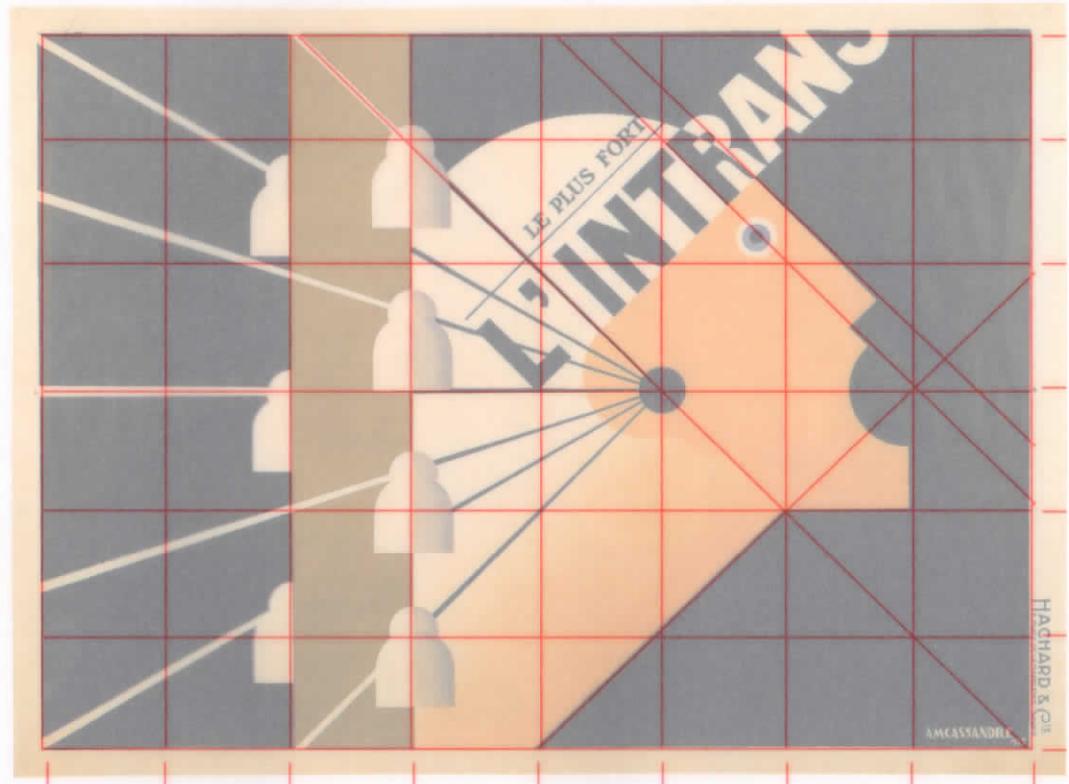
study in geometric construction. The poster is for the Parisian newspaper, *L'Intransigéant*, and the conceptual triumph is the translation of the representational form of a woman's head into the visual symbol of Marianne, the voice of France.

Cassandre was educated as an artist and studied painting at a number of studios in Paris. Indeed, he took the pseudonym Cassandre with the idea that



when he returned to painting that he would do so under his given name, Adolphe Mouron. Very soon, however, he became fascinated by poster art and found that it held more potential for dynamic experimentation than did painting for him. The idea of mass communication was appealing as well as the idea of an art that crossed the traditional and entrenched boundaries of class distinction.

Because of his interest and studies in painting, Cassandre was deeply influenced by Cubism. In an interview in 1926 he described Cubism: "...its relentless logic and the artist's endeavors to construct his work geometrically bring out the eternal element, the impersonal element beyond all contingencies and individual complexities." He acknowledged that his work was "essentially geometric and monumental," and the elements of geometric construction can be



Analysis

The poster format is organized into a series of modules 6 X 8, yielding a total of 48 square visual fields. All elements of the poster correspond to this plan in terms of placement and proportion. The inner ear is at the intersection of these visual fields as is the center of the mouth. The corner of the "L" lands in the exact center of the poster. The chin of the figure fits into a visual field, as does the

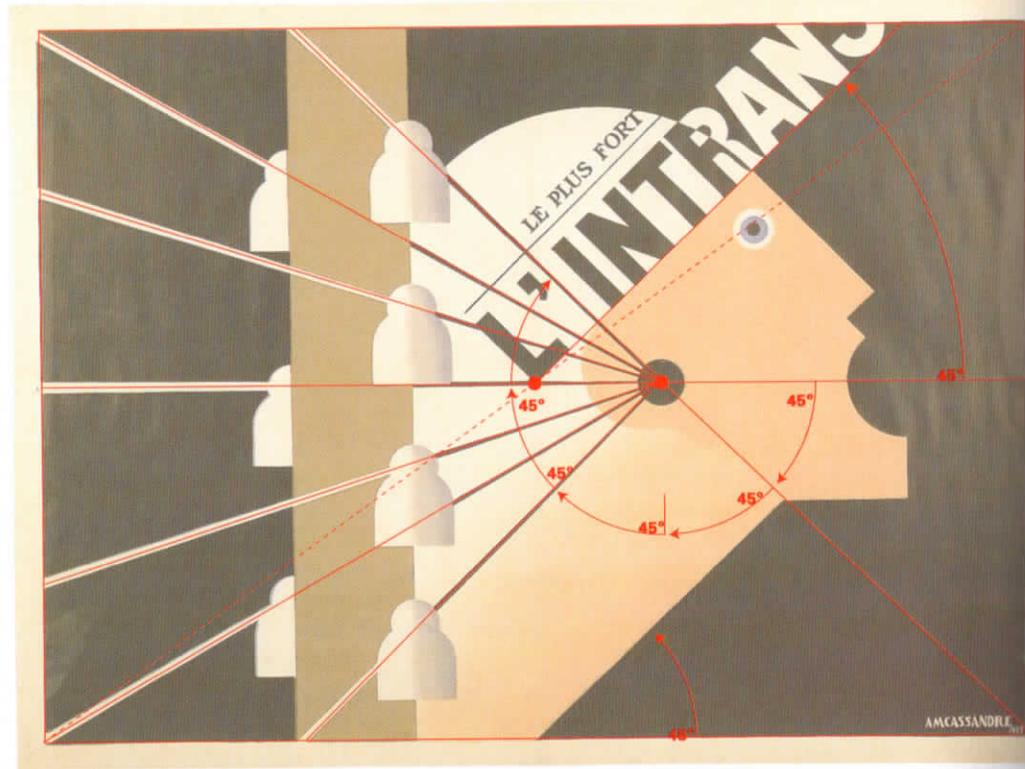
telegraph pole. The 45° angle of the neck moves from corner to corner of a square of four visual fields. The telegraph wires begin at the ear center and move at 15° increments forming again 45° angles above and below the horizontal.

found in almost all of his posters. In particular Cassandre was very conscious of the compelling visual power of the circle and consciously used the circle in this poster and many other posters to direct and focus the viewer's attention.

In addition to fine-art Cubism, the poster movement called Sach Plakat, or the object poster, influenced Cassandre's work. The object poster movement

departed from the expressive and embellished work of the past with objectivity and function as the primary goals. This philosophy was echoed by the Bauhaus in the 1920s and can be seen repeatedly in Cassandre's posters throughout his career. In *L'Intrans* the newspaper is reduced to a just a portion of the masthead that overlaps a more powerful symbol, Marianne, the voice of France.

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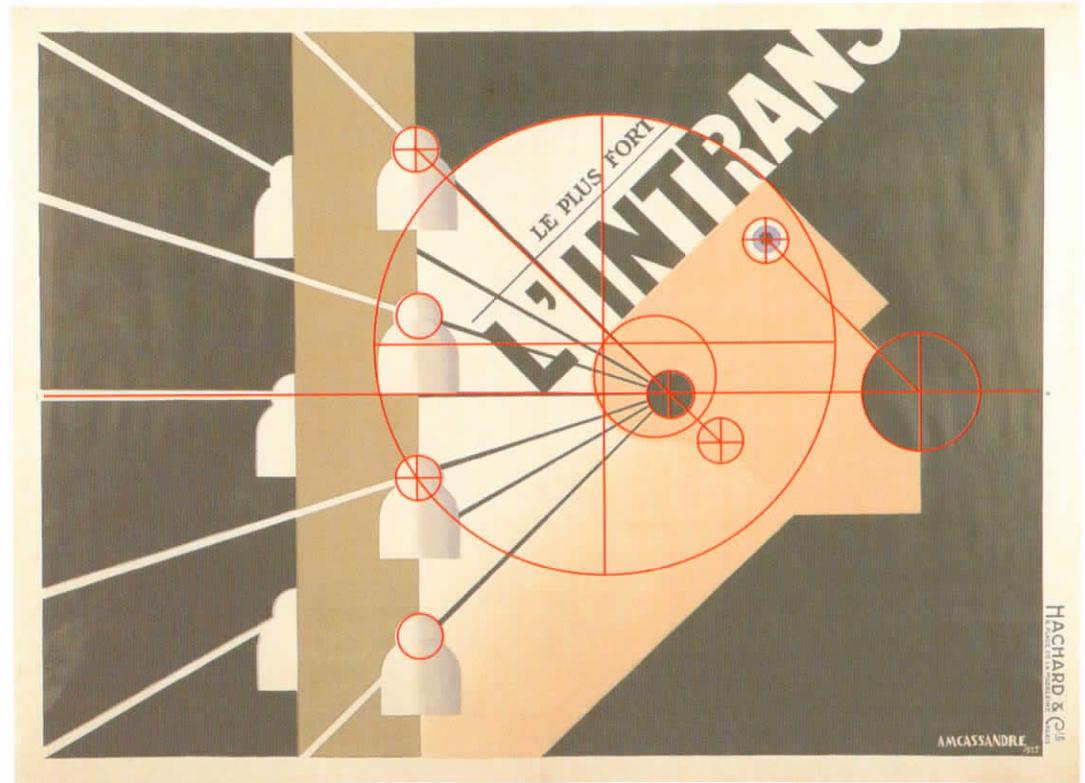
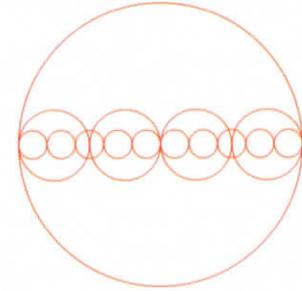


Angles and Root 2

The format of the poster is a root 2 rectangle. The eye is bisected by the diagonal of the root 2 rectangle, shown with a dashed line. This diagonal also bisects the center of the poster at the lower left corner of the "L." The baseline of the word, L'INTRANS, is at a 45° diagonal from the center of the poster. The telegraph wire lines are arranged at approximately 15° increments which yield the 45° module that is repeated in the nose and neck angles.

Circle Diameter Ratios

- head circle = 4 mouth circles
- mouth circle = outer ear circle
- mouth circle = 2 1/2 small ear circles
- inner ear circle = eye circle
- inner ear circle = insulator circles
- inner ear circle = ear lobe circle



Circle Proportions

The outer ear and mouth circles are the diameter of one visual field. The smaller circles of the eye, inner ear, ear lobe, and insulator have a diameter of two fifths of a visual field. The largest circle, the head, has a diameter of four visual fields.

The placement of the circles is organized so that the center points of circles on the head are aligned on 45° diagonals. The insulator circles are all aligned on diagonals at approximately 15° increments. Three of these 15° increments yield the 45° module.

East Coast by L.N.E.R. Poster, Tom Purvis, 1925

Tom Purvis' 1925 poster, *East Coast by L.N.E.R.*, is an invitation to the viewer for summer vacation travel on the London Northeast Railroad. More than twenty-five years earlier two designers who called themselves the Begarstuffs experimented with the then radical approach of developing powerful compositions of flat areas of color defining simplified graphic silhouettes. Purvis' poster uses a similar technique of simplification and play of space, color, and pattern.

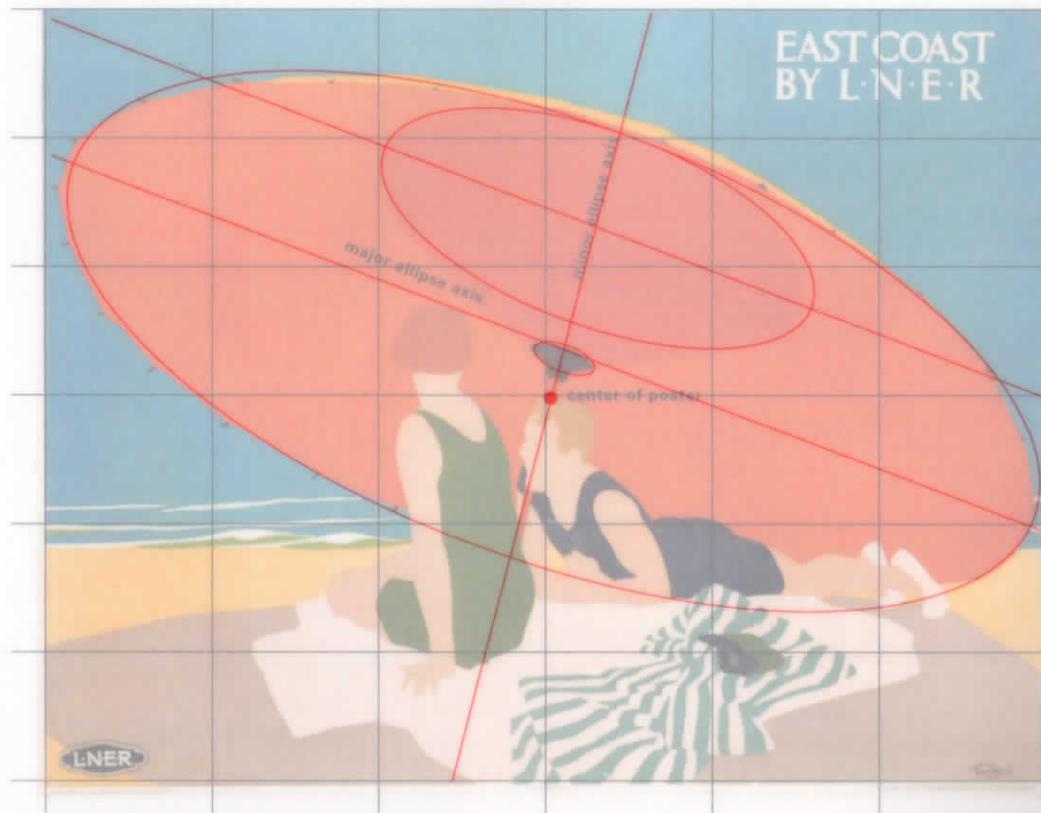
The umbrella ellipse is the most powerful and compelling visual force in the poster, not only because of the vibrant color but also because of the shape and diagonal placement. The bright orange is in complimentary contrast to the blue sky and water. The elliptical shape is close to the shape of the circle, which attracts more visual attention than any other geometric form. The diagonal direction is the most provoking visual direction due to its instability

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and implied motion. The dramatic ellipse is repeated two more times in the interior structure of the umbrella and in the black pole support.

All of the shapes are simple silhouette shapes created with great economy of detail. The striped texture and casual arrangement of the towel provides a change in texture from the simple shapes.



Analysis

The poster is readily analyzed by means of a 6 X 6 grid. The horizon line of the sky and water divides the poster and occupies the top two thirds. The minor ellipse axis of the orange umbrella passes through the center of the

poster and balances the composition. The figures rest left and right of this axis, providing a balance of color and shape.

Barcelona Chair, Mies van der Rohe, 1929

The *Barcelona Chair* was designed in 1929 for the German Pavilion at the International Exhibition in Barcelona, Spain. The pavilion was unlike any of the others in that it did not contain any exhibits; the building itself was the exhibit. Elegant, sparse, and consisting of travertine marble, gray glass, chrome columns, and dark green marble, the building's only furnishings were *Barcelona Chairs* and *Barcelona Ottomans* upholstered in white leather, and *Barcelona Tables*. The ottomans and tables used a

support "x" frame similar to the chair. Mies van der Rohe designed the building and the furniture, and both are considered milestones of design as well as the greatest achievement of van der Rohe's European career.

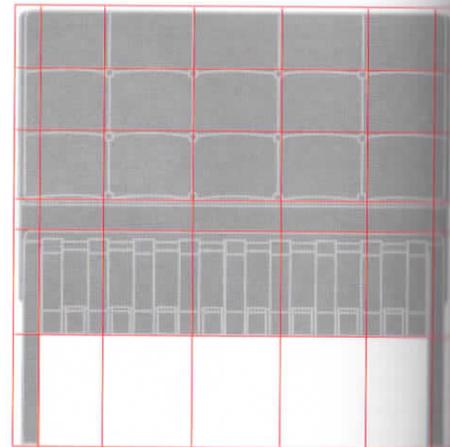
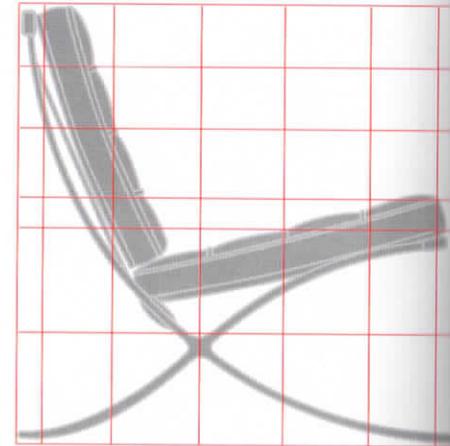
It's difficult to believe that such a contemporary, classical piece was designed and produced more than seventy years ago. The *Barcelona Chair* is a symphony of meticulous proportions based on a simple



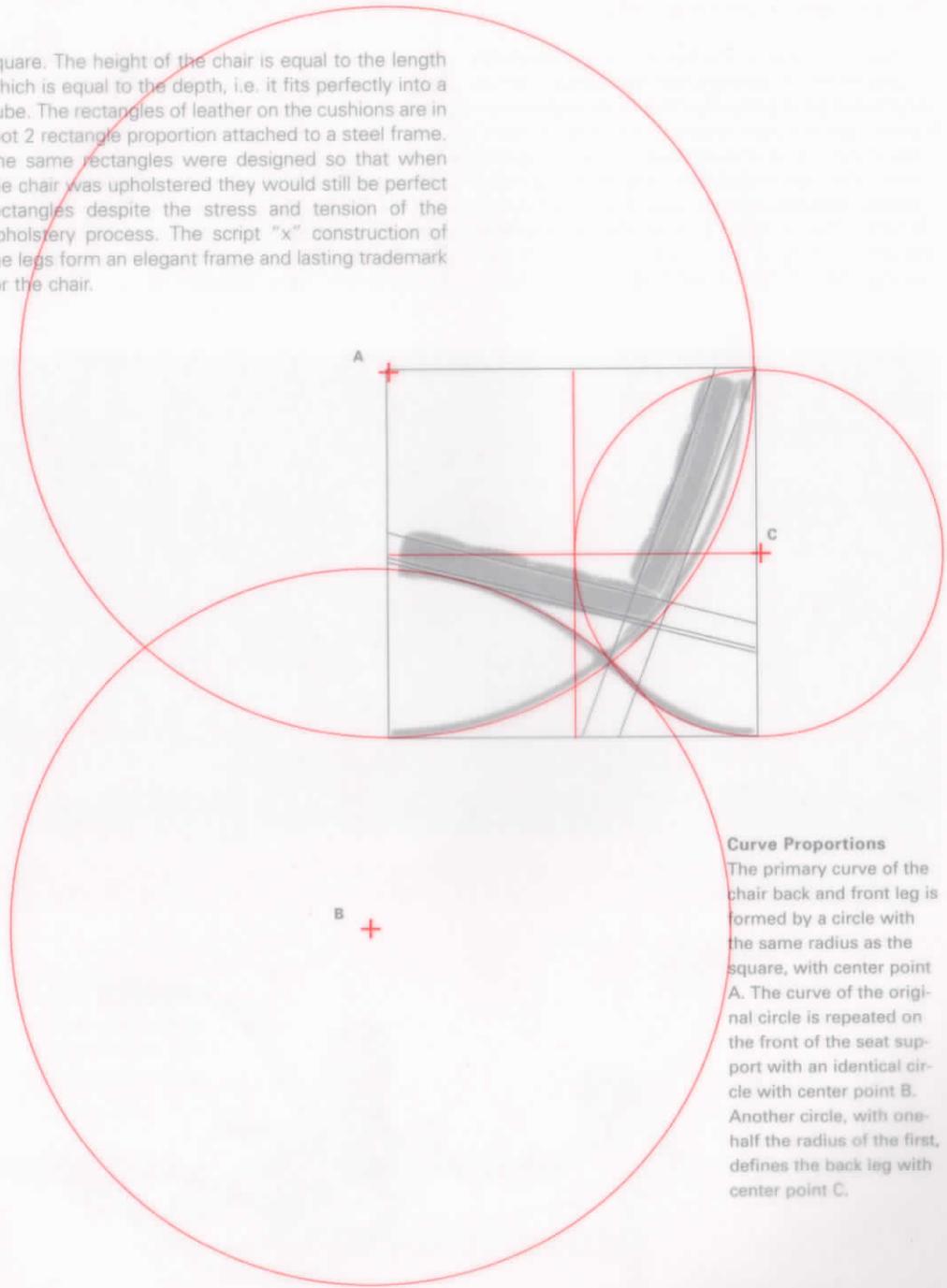
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Chair Proportions (right)

The chair side view (top right) as well as front view (bottom right) fit perfectly into a square. The divisions of the back cushion approximate small root 2 rectangles.



square. The height of the chair is equal to the length which is equal to the depth, i.e. it fits perfectly into a cube. The rectangles of leather on the cushions are in root 2 rectangle proportion attached to a steel frame. The same rectangles were designed so that when the chair was upholstered they would still be perfect rectangles despite the stress and tension of the upholstery process. The script "x" construction of the legs form an elegant frame and lasting trademark for the chair.



Curve Proportions

The primary curve of the chair back and front leg is formed by a circle with the same radius as the square, with center point A. The curve of the original circle is repeated on the front of the seat support with an identical circle with center point B. Another circle, with one-half the radius of the first, defines the back leg with center point C.

Chaise Longue, Le Corbusier, 1929

Architects educated in the Beaux Arts tradition often are very aware of the principles of classic proportion, and involve these principles both in the architecture and furniture that they design. Le Corbusier is one of these architects and the attention to detail and proportion in his architecture can also be found in his *Chaise Longue*. Corbusier was influenced in the 1920s by other architects such as Mies van der Rohe who were designing tubular steel furniture for their buildings. Both Corbusier and Mies were influenced

by the geometric forms of Thonet Bentwood furniture and used simplified similar forms in their own work.

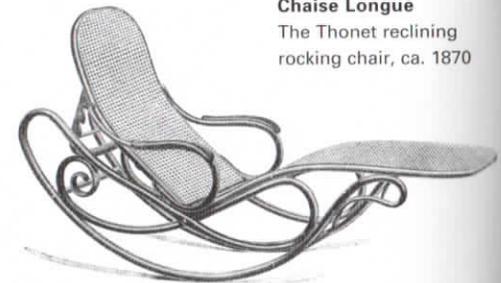
In 1927, Le Corbusier began a collaboration with Charlotte Perriand, a furniture and interior designer, and his cousin, Pierre Jeanneret. The collaboration was highly successful and led to a number of classic furniture designs that bear Le Corbusier's name, including the *Chaise Longue*.



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**Predecessor of the
Chaise Longue**

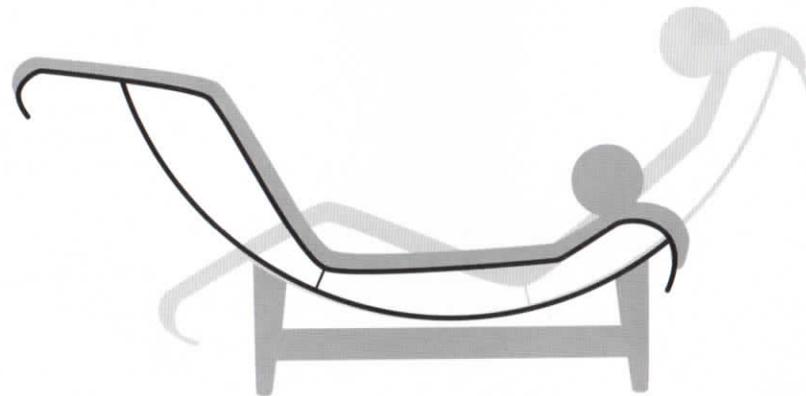
The Thonet reclining
rocking chair, ca. 1870



The chrome tubular frame of the Chaise is an arc runner that rests on simple black stand. This arc is an elegantly simple system that slides in either direction and allows the user an infinite variety of positions, and is held in place by friction and gravity with either the head or feet raised. Similar to the geometric arc frame, the pillow is also a geometric form of a cylinder that is easily repositioned by the user. The arc of the frame is such that the frame can be removed from the stand and used as a reclining rocker.

Analysis

The proportions of the chaise relate to the harmonic subdivisions of a golden rectangle. The width of the rectangle becomes the diameter of the arc that is the frame of the chaise. The stand is in direct relationship to the square in the harmonic subdivision. The Chaise Longue is analyzed by a harmonic decomposition of a golden section rectangle.



Brno Chair, Mies van der Rohe, 1929

Mies van der Rohe received a commission to design a family residence for the Tugendhat family based on his highly acclaimed architecture for the Barcelona Pavilion in 1929. In addition, he was asked to design furniture for the residence that would be in keeping with the stark modernism of the building.

Mies had successfully developed a cantilever armchair, the MR Chair, in 1926. At the time the technology of bending tubular steel was new and presented

innovative design options. The design of the MR Chair was based on earlier nineteenth-century designs of tubular iron rockers and the celebrated Bentwood Rocker by Michael Thonet. Because of the strength of tubular steel the frame of the MR Chair was cantilevered and the design simplified.

The Tugendhat house had a large dining room and a table that could seat 24. The MR Chair was originally specified for this purpose but was awkward as a



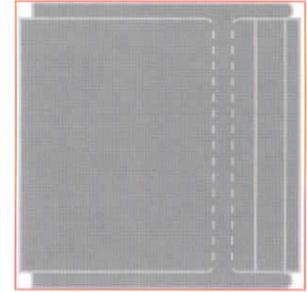
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Predecessors of the Brno Chair

(left) Thonet Bentwood Rocker, ca. 1860, (right) side view of the MR Chair, Mies van der Rohe, 1926

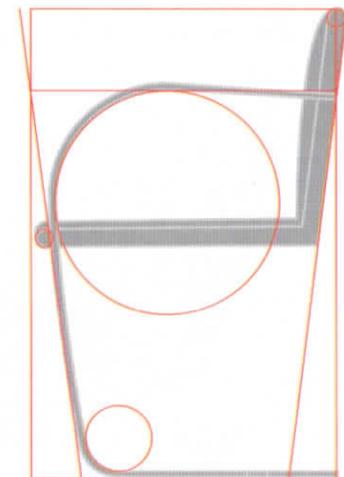
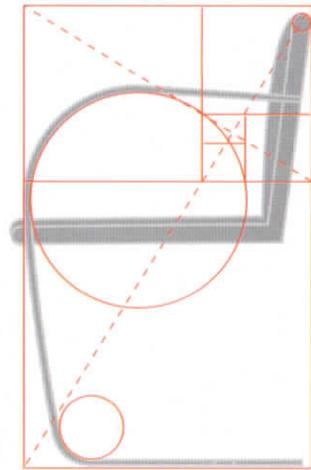
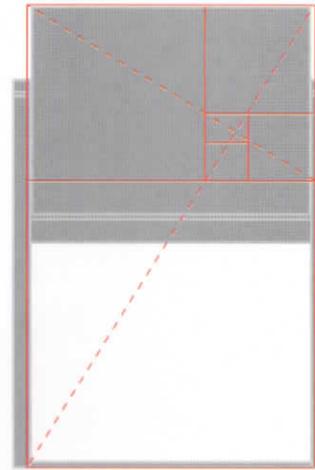


dining chair because the extended arms did not fit under the table. The Brno Chair, named after the town of Brno where the Tugendhats lived, was designed for this purpose and the low sweep of the arms and compact form fit neatly under a dining table. The original chairs were upholstered in leather and the design was executed in both tubular steel and flat bar versions, which resulted in structural variations.



Analysis

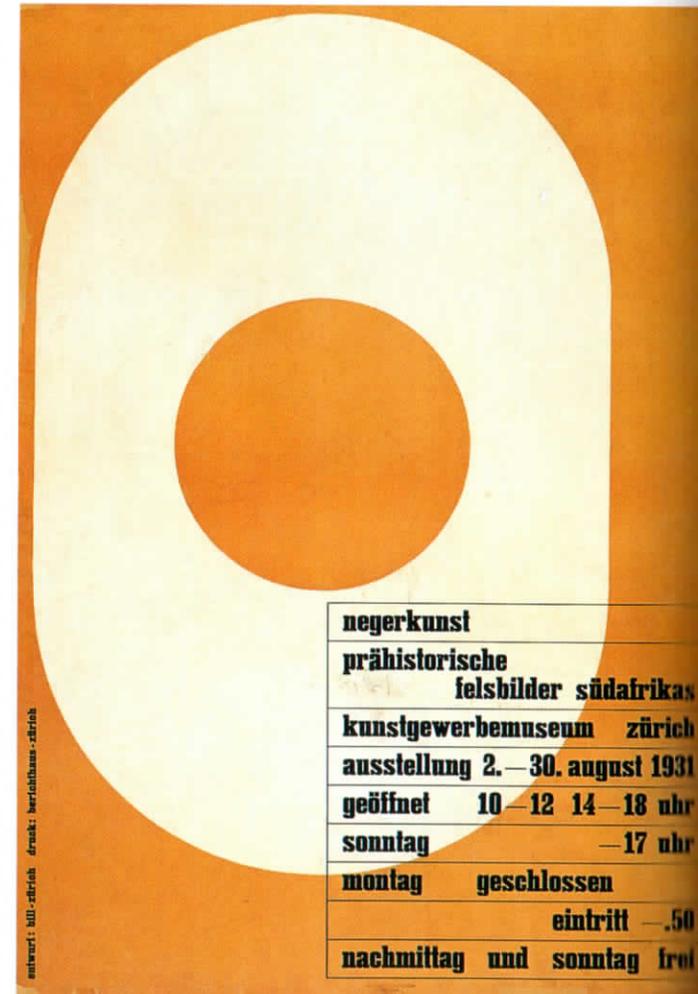
The chair top view fits perfectly into a square (above right). The front view of the chair (right) and side view (far right) fit neatly into a golden section rectangle. The angle of the front legs and chair back (below right) are symmetrical, and the radii of the curves are in 1:3 proportion.



Negerkunst Poster, Max Bill, 1931

This poster was for an exhibition of South African prehistoric rock painting. The fierce simplicity and geometry of Max Bill's 1931 *Negerkunst* poster have roots in the development of the Art Concrete ideal of the 1930s. This movement demanded arithmetical construction of pure visual elements. Bill embraced this ideal as a universal visual language of absolute clarity.

The diameter of the center circle becomes the measure for the entire figure. The measure of diameter is the same as the height of the top bottom. Half of this diameter is the measure of sides. The vertical that pierces the center of the circle becomes the axis for the left edge of the type



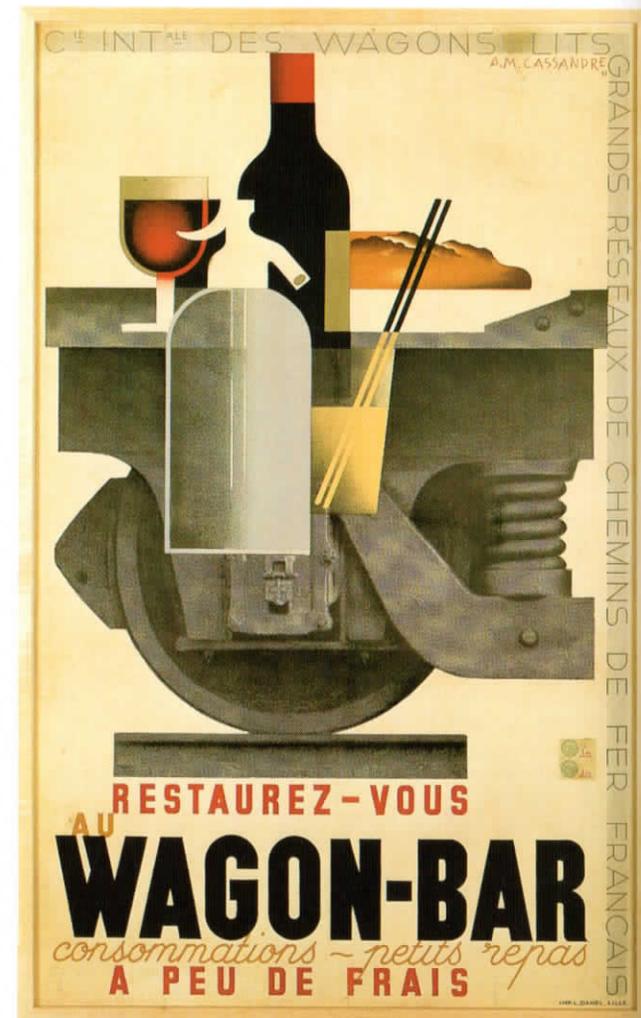
Wagon-Bar Poster, A. M. Cassandre, 1932

"Some people call my posters Cubistic. They are right in the sense that my method is essentially geometric and monumental. Architecture, which I prefer above all others, has taught me to abhor distorting idiosyncrasies... I have always been more sensitive to forms than to colors, to the way things are organized than to their details, to the spirit of geometry than to the spirit of refinement..."

Adolphe Mouron, A. M. Cassandre, *La Revue de l'Union de l'Affiche Française*, 1926

The *Wagon-Bar* Poster is no less a marvel of geometric interrelationships than is the earlier *L'Intrans*. Again, Cassandre selects representational elements to be simplified and stylized into simple geometric forms. The seltzer bottle, wine and water glasses, loaf of bread, wine bottle, and straws are placed in front of a photograph of a train wheel.

The diameter of the wheel becomes the measure of the railroad track segment that emphasizes,



"RESTAUREZ-VOUS," and "A PEU DE FRAIS." The center of the poster is visually punctuated by the ends of the two straws in the drinking glass. The poster is easily divided into thirds on the vertical.

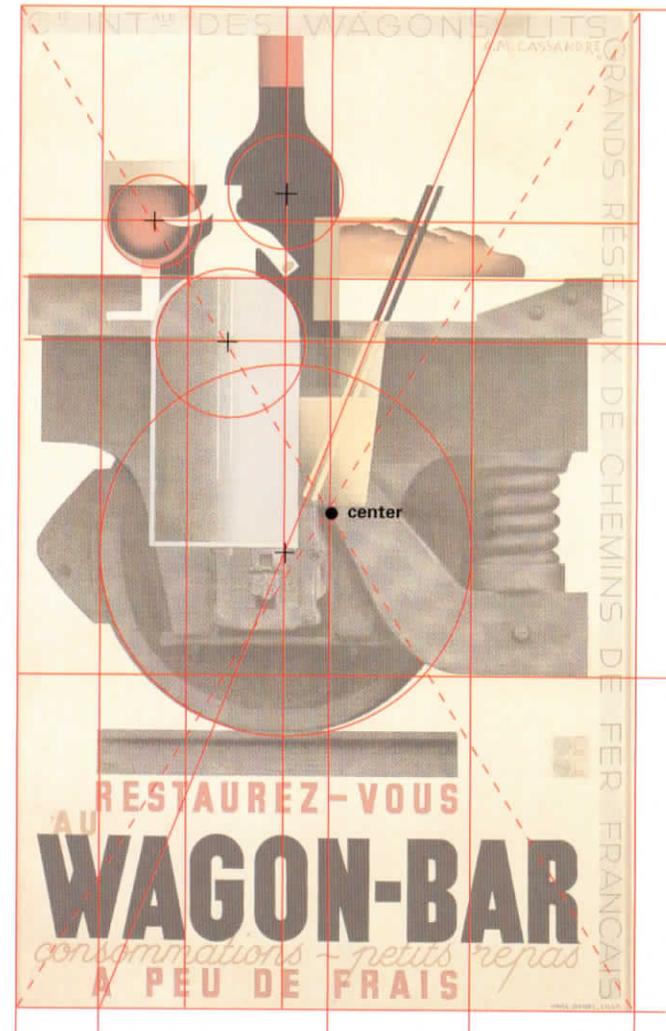
The geometry of the drawn images is apparent in the shoulders of the bottles and the bowl of the wine glass. There is a beautiful play of space as the white background of the poster bleeds into the siphon top of the seltzer bottle. A similar change of space occurs

with the bread loaf and the wine bottle label as well as the top of the glass and the edge of the wheel casing.

This poster is relatively complex in the number of elements that require geometric simplification, structural interrelationships, and organizational control. Yet upon analysis it is clear that there is a reason for each and every decision.

Analysis

Conscious placement and control of each element is evident in the center points of the circles that form the wine glass bowl and the shoulders of the seltzer bottle as they land on the diagonal from the upper left corner to lower right corner. Likewise, the center of the wine bottle circle and the wheel center align on the same vertical.



Konstruktivisten Poster, Jan Tschichold, 1937

"We do not know why, but we can demonstrate that a human being finds planes of definite and intentional proportions more pleasant or more beautiful than those of accidental proportions."

Jan Tschichold, *The Form of the Book*, 1975

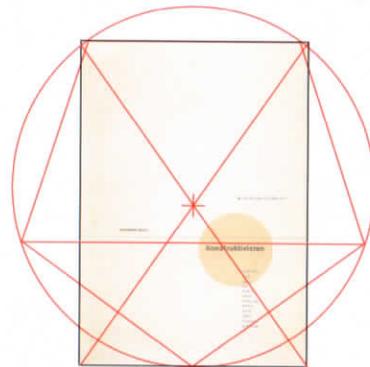
This poster, created by Jan Tschichold in 1929, was for an exhibition of Constructivist art. Since this poster was created at a time when the Constructivist movement was dissipating, the circle and line can be

interpreted as a setting sun. The Constructivist art movement mechanized fine art and graphic design via mathematical placement of abstracted geometric elements as a functional expression of industrial culture. As a poster, this work utilizes the Constructivist ideals of geometric abstraction, mathematical visual organization, and asymmetric typography as advocated in Tschichold's book, *Die Neue Typographie*, published in 1928.



Analysis

The diameter of the circle becomes a unit of measurement for the poster and placement of the elements. The circle itself is a focal point and the eye is inexorably pulled toward it. The circle also highlights the title of the exhibition as well as the list of exhibitors. The small bullet circle next to the line of text with the dates of the exhibition is an element of visual punctuation as it echoes to and contrasts in scale with the major circle. The list of exhibition contributors begins at the meeting point of the diagonals of the poster format and the diagonal of the bottom rectangular section. The distances of the text to major elements are modules of the distance from the horizontal line to the base line of "konstruktivisten," which is centered in the circle.

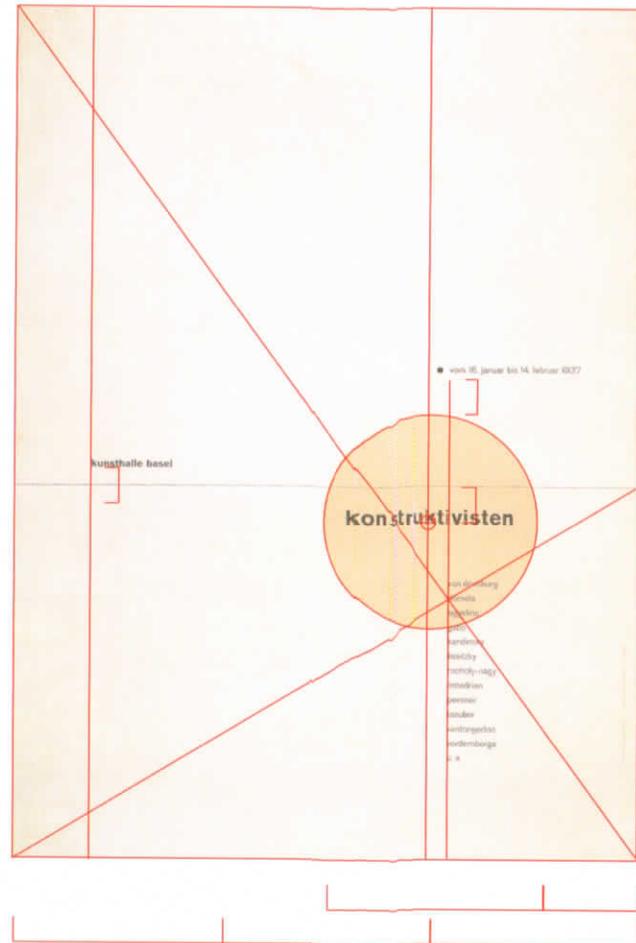
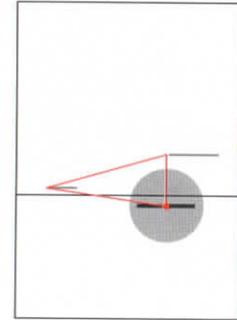


Format Proportions

The narrow rectangular format is a pentagram page and is derived from a pentagon inscribed in a circle. The top surface of the pentagon becomes the width of the rectangle and the bottom point the bottom of the rectangle. The horizontal line in the poster is placed so as to connect two of the vertices of the pentagon.

Compositional Triangle

The typography of the poster forms a triangle which serves to anchor it to the format and enhance visual interest.



Der Berufsphotograph Poster, Jan Tschichold, 1938

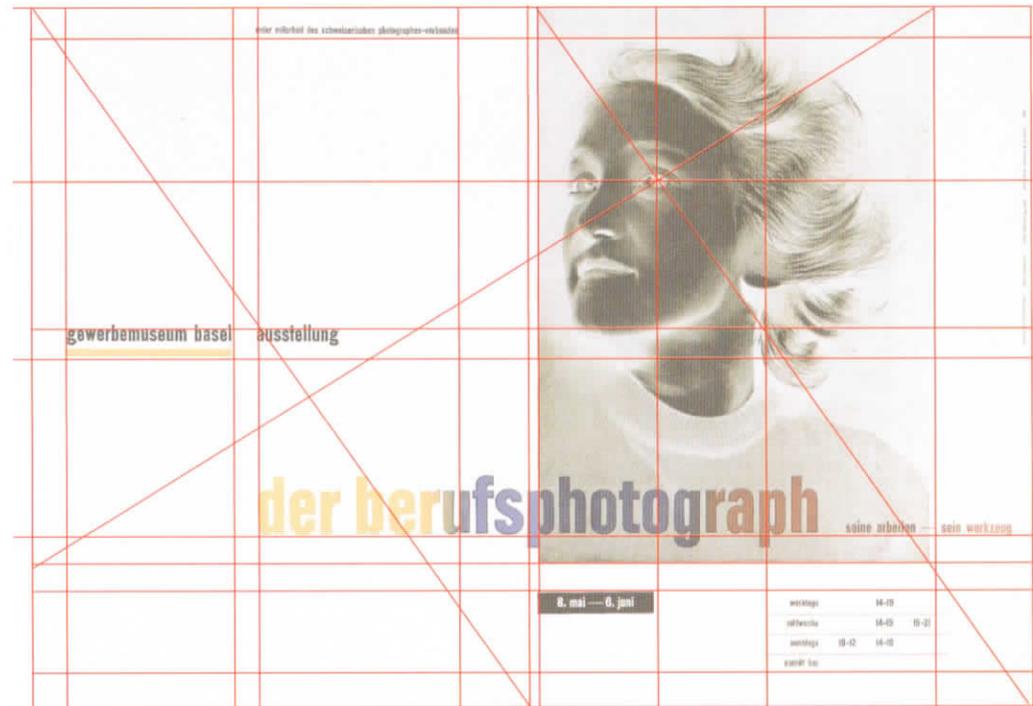
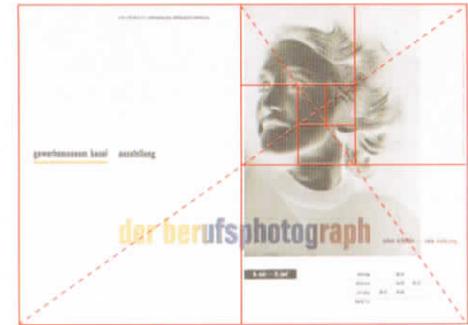
This 1938 poster by Jan Tschichold was for an exhibition of the work of professional photographers and is a classic in concept and composition after many decades. Because of the exhibition content, the image of a woman is representational but also abstracted in that she is portrayed as a film negative. This technique focuses the viewer's attention on the process of photography rather than on a single image of a woman. The main title, "der berufsphotograph,"

is printed as a split font, whereby three different colors of ink, yellow, red, and blue are placed on a printing roller and "mix" as the roller turns. This rainbow of color in the typography is a rare expressionist departure from the formalism of Tschichold's other work. However, his love of asymmetric and functional typography are evident in the layout of carefully aligned and related typographic elements and textures.



Root 2 Rectangle Relationships

The root 2 construction diagram is placed on top of the poster. The corner of the reciprocal and the diagonals bisect the eye of the figure in the photograph.



Analysis

The negative photograph is just to the right of the center of the root 2 rectangle format. The left eye of the figure is carefully placed and the image cropped so as to become the nexus of diagonals that regulate the placement of elements. The measure of the width and depth of the image is echoed by the typographic elements to the left.

center
line

Plywood Chair, Charles Eames, 1946

Although he had a full scholarship to study architecture, Charles Eames left college after two years at Washington University in St. Louis. The curriculum was based on the traditional principles of the Academy of the Beaux Arts, which clashed with his avid interest in modernism and the work of Frank Lloyd Wright. However, throughout his life he appreciated the foundation that the Beaux Arts training had given him in the classical principles of proportion and architecture.

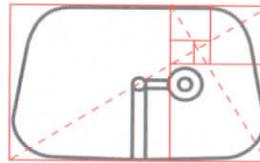
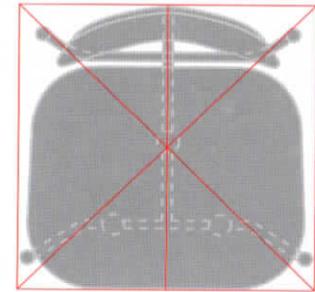
His *Plywood Chair* was designed for an Organic Furniture Competition sponsored by the Museum of Modern Art in 1940. Eames and his collaborator architect Eero Saarinen sought to bring organic forms together into a unified whole. As a result the beautiful curvilinear forms caught the eye of the judges, as did the innovative technologies of three-dimensional molded plywood and a new rubber weld technique that joined the plywood to metal. The entry won first place.



Plywood Chair

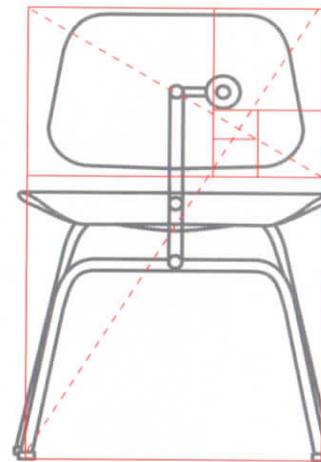
(above) All plywood version and (right) plywood and metal version. The chair was made in two versions; a lower lounge chair version and a slightly higher dining chair version.

The current chair, still in production, evolved from that winning entry. It is impossible to state unequivocally that the relationship of the chair's proportions to the golden section rectangle were fully consciously planned, but the classical Beaux Arts training, as well as the collaboration with Eero Saarinen, make this assumption highly likely.



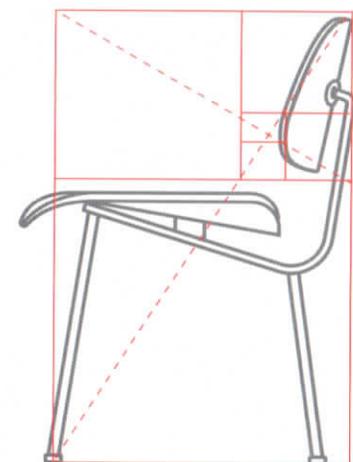
Chair Back (above)

The chair back fits perfectly into a golden section rectangle.



Chair Proportions (right)

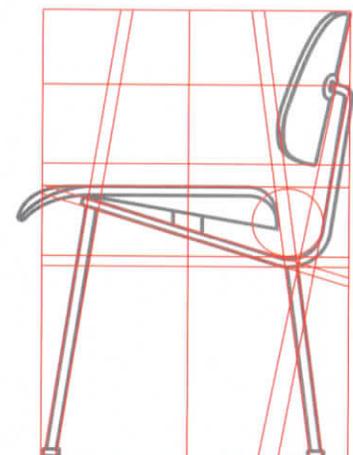
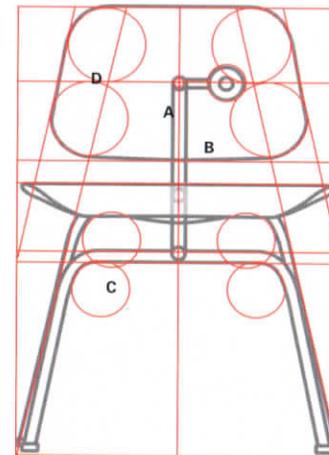
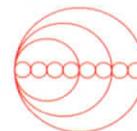
The dining chair proportions are roughly those of the golden section.



Chair Detail Proportions

The radii of the corners of the chair back as well as the tubular legs are in proportion to each other 1:4:6:8.

- A= 1
- B= 4
- C= 6
- D= 8



Konkrete Kunst Poster, Max Bill, 1944

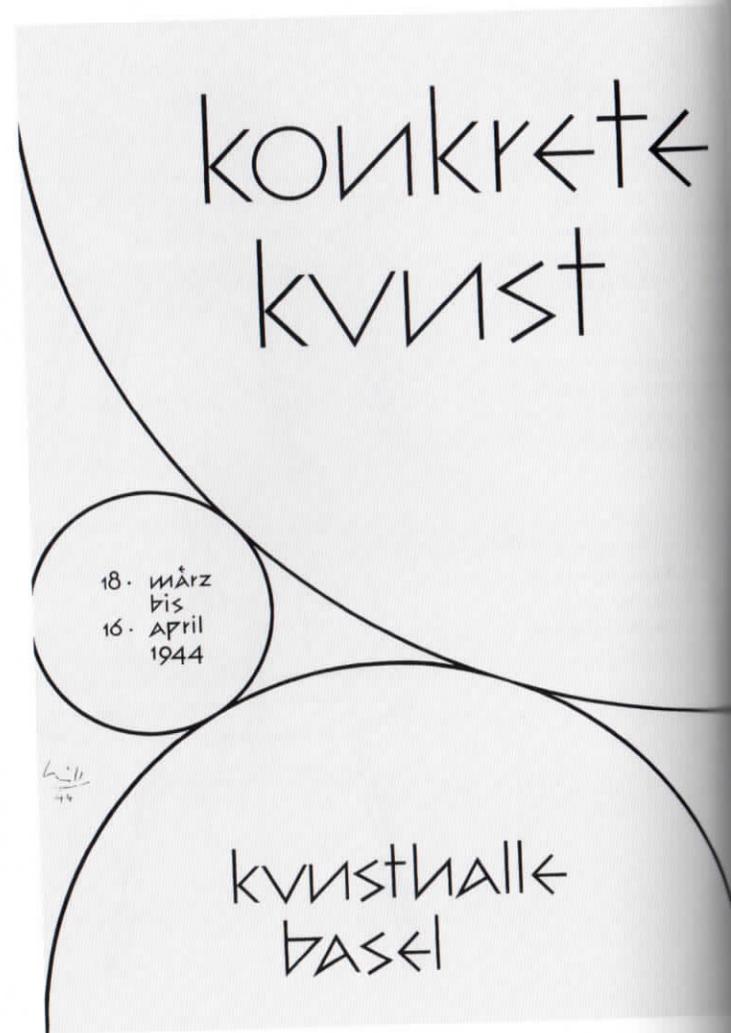
"I am of the opinion that it is possible to develop an art largely on the basis of mathematical thinking."

Max Bill, from an interview in 1949, *Typographic Communications Today*, 1989

Max Bill was distinguished as a fine artist, architect, and typographer. He studied at the Bauhaus under Walter Gropius, Moholy-Nagy, and Josef Albers among others. At the Bauhaus he was influenced by the ideals of functionalism, the De Stijl style, and for-

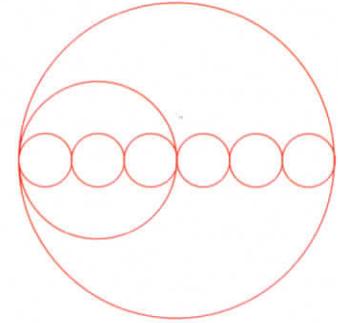
mal mathematical organization. The hallmarks of the 1920s De Stijl style included a very formal dividing of space with horizontal and vertical lines. This style had softened by the time this work was created in 1944. The space is divided but with a circle and arcs, and the rigid horizontal lines of some De Stijl typefaces are evolved to include circles and diagonals.

Bill's use of geometric abstraction was developed to include the typographic elements as well. The letter



Root 2 Construction (right)

Root 2 construction relates directly to the placement of the circles. The diagonal pierces the centers of the largest and smallest circles, and the smallest circle rests on the line of the root 2 construction square.



Circle Proportions (far right)

The proportion of the circles is 1:3:6.

Analysis

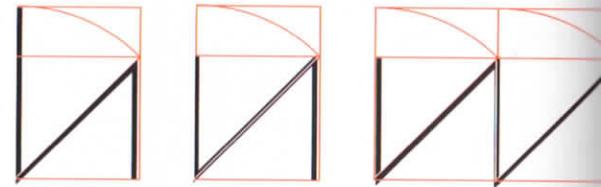
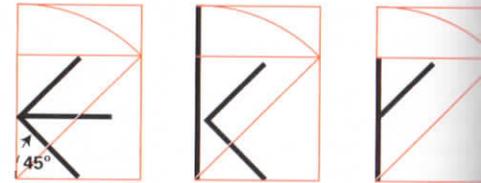
The diameter of the smallest circle is 1/3 the poster width as well as 1/3 the diameter of the next largest circle, and 1/6 the diameter of the largest circle. The smallest type has an alignment with the smallest circle and the larger type aligns with the circle tangent and edge of the smallest circle.



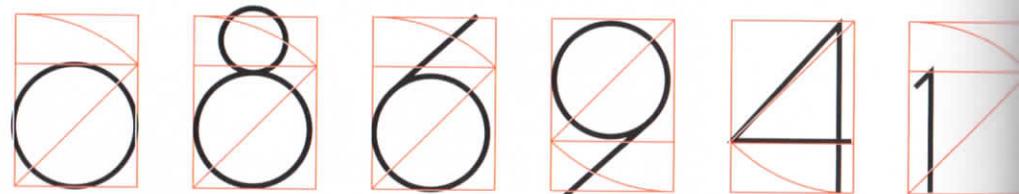
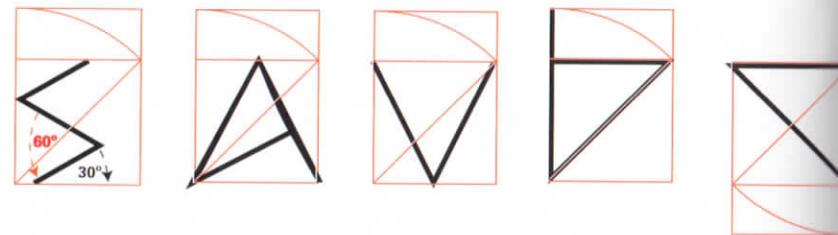
forms are hand generated and based on the same root 2 principle as the poster format. Each typographic character has a direct geometric relationship to the structure of the root 2 rectangle and is created in modular form. The font was used for other posters and also for an exhibit that Bill designed in 1949.

Type Construction

The construction square of the rectangle is the base line and mean line or x-height of the lowercase font. The ascenders and descenders are defined by the length of the root 2 rectangle. The strokes are based on geometric construction with angles restrained to 45°. Deviation of the angles occurs in the "s" with 30° and 60° construction, and in the major strokes of the "a" and "v" with 63° angles. Two root two rectangles are used to create the "m" which is two repeated "n" shapes. The numbers are created with the same construction methods, utilizing a perfect circle, which reflects the larger circle shapes in the composition.

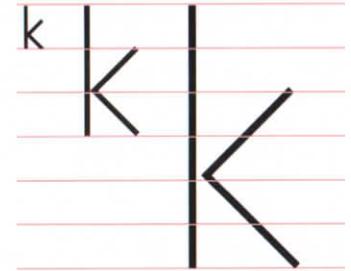


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Letter Form Size Proportions

The letter forms are of a single weight and the same proportion as the circles, 1:3:6.



Pevsner, Vantongerloo, Bill Poster, Max Bill, 1949

This poster designed four years after *Konkrete Kunst*, uses the same letter form construction. Bill later slightly refined the letter form construction for use in an exhibition, and this face is currently available from The Foundry in London.

