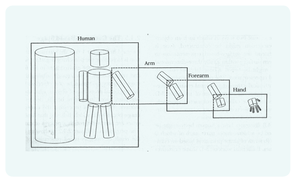
From Form Recognition to Form Creation:

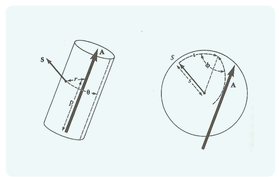
FROM DAVID MARR TO FRANK LLOYD WRIGHT

David Marr's Primitives:

Object-centered axes of primitives

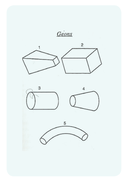


Organization of primitives



Specifying the spatial relationship of primitive axes to each other

From this point on, Marr's primitives serve as an armature for the measured addition of detail. The symmetry of the primitives facilitates measurement. Considerable elaboration will follow to fully articulate a final form.

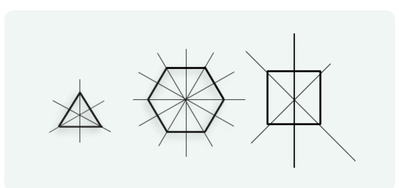


Geons, if they exist, may abet the process

Final result:
An accurately depicted figure

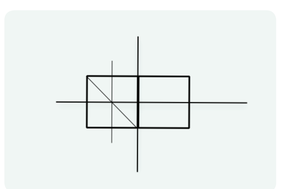
Frank Lloyd Wright's Primitives:

THE PRIMITIVES

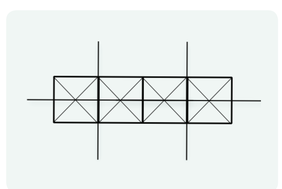


The tileable regular polygons and their axes

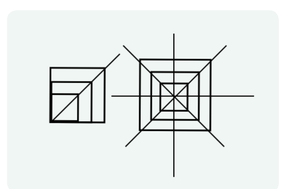
PERMUTATIONS OF THE PRIMITIVES



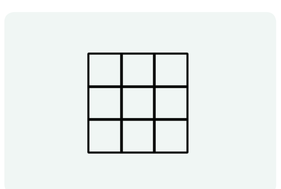
Double-square



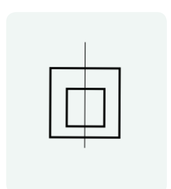
Run of squares



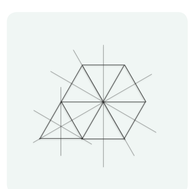
Rescaling



Tiling



Bilateral symmetry



Equilateral triangle and hexagon

The equilateral triangle and hexagon are kin and readily interact, one form generating the other.

In the VC Sundt, a triangular home emerges from a hexagonal grid.

1 **Building on Primitives is the key to David Marr's theory of form recognition and to Frank Lloyd Wrights method of form creation.**

- The critical elements held in common by the Marr and Wright primitives are their simplicity, their symmetry, and their ability to be superimposed at different scales.
- From the largest to the smallest, the primitives remain and retain their integrity in the final form, cycling in a dynamic, time-dependent percept.

  For Marr, "The stability of the representation is greatly enhanced by including both large and small primitive descriptions of the shape and by decoupling local spatial relations from more global ones." (pg. 306, *Vision*)

  For Wright, inclusion in the aesthetic image of all primitives, large and small, promotes stability while generating movement and vitality. For him, the primitives and their permutations remain simple and pleasing but, by cycling, are experienced integrated into a rich fabric.
- **Marr's** primitives are all generalized cones, "armatures" on which the final form will be articulated.
- **Wright's** primitives are found in the plans of the buildings and can be considered cross-sections of generalized cones that rise from the plan to form the building. The plan has considerable power to express the three-dimensional building, thanks to the asymmetry imposed by gravity on our spatial experience. Gravitation constrains how the building rises from the the plan in the vertical dimension; hence the two planar dimensions dominate. "The plan is the beginning and the end…" Wright has written. Wright focuses on the plan, and by limiting himself to the regular polygons, weaves his magic by crystallizing simple and symmetrical but ultimately highly developed forms about the two planar axes and subordinate diagonal axes.

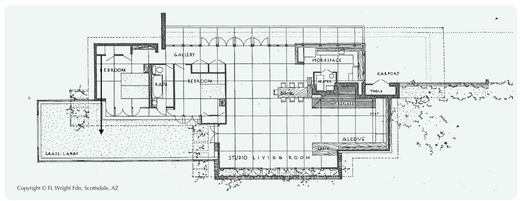
2 **In his determined search for simplicity Wright intuitively went to basic mechanisms of perception; thereby he achieved maximum effect from least effort, reaping complex but thoroughly integrated compositions from the simplest means.**

3 **This gives us the foundations for a Theory of Aesthetics; a theory of simplicity in variety, of maximum effect from minimum effort. As given rigorous treatment in the 1920s by the mathematician George Birkhoff:**

Aesthetic Measure M = Order O/Complexity C

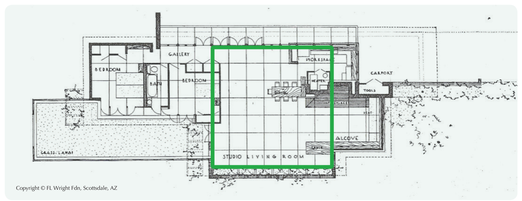
(Note that Complexity is in the denominator: thus, the more Complexity, the less Aesthetic Pleasure. With respect to order, Birkhoff writes that "the object [of aesthetic contemplation] is characterized by a certain harmony, symmetry, or order (O), more or less concealed, which seems necessary to the aesthetic effect.)

Frank Lloyd Wright's Process:



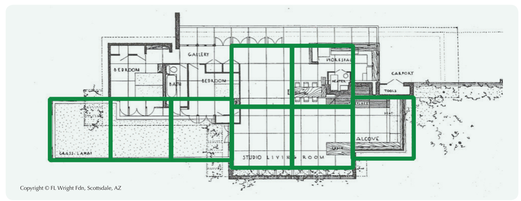
The GOETSCH-WINKLER HOUSE
Built in 1939 in Okemos, Michigan. Like all of his works it is designed on a grid of regular polygons. This house is based on a grid of 4' squares.

"The buildings I have built – large and small – are fabricated upon a unit system…" FLIW



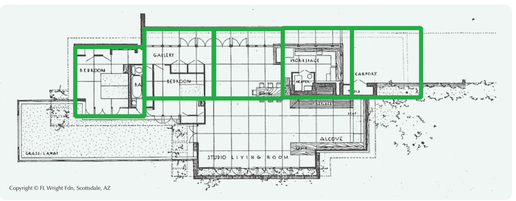
Its underlying theme, the square, is dramatically introduced by one large 7-unit square that extends from one window wall to the other and runs the width of the living room, centering and stabilizing the living area.

"'Think in simples' as my old master used to say, - meaning to reduce the whole to its parts in simplest terms, getting back to first principles." FLIW

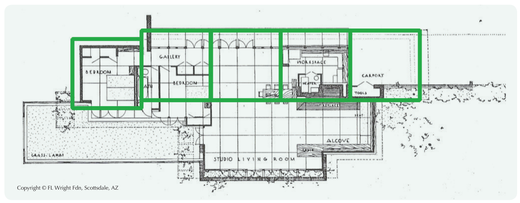


This 7-unit square subdivides into four 3½-unit squares, and these multiply along the lower part of the plan to generate a run of six 3½-unit squares outlining the grass lanai at one end and the outer edges of the alcove roof at the other.

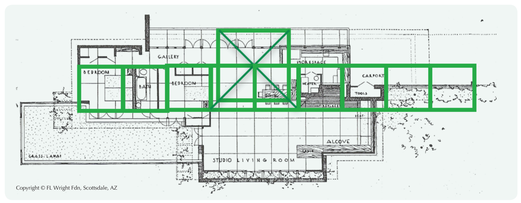
"The differentiation of a single, certain, simple form characterizes the expression of one building." FLIW



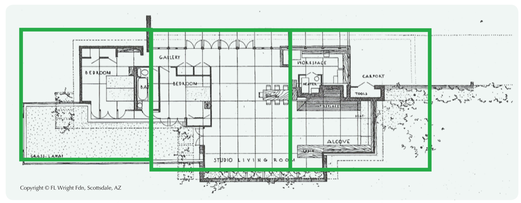
Above this run a series of 4-unit squares fixes the carport roof at one end and terminates at the prominent entry pier at the other. A fifth 4-unit square translated down one unit outlines the master bedroom and its porch.



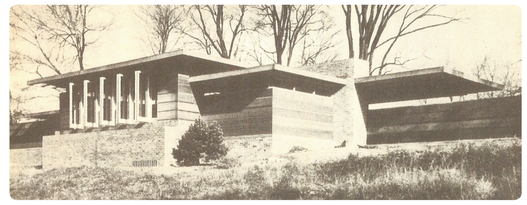
The upper 5-unit run, aligns with the roof line but not with the interior walls; but if we slide the run ½ unit to the left, we now find that the vertical sides of two squares coincide with the inner bedroom and the kitchen walls, and the fifth square, when slid downward ½ unit, perfectly coincides with the bedroom rooflines and lower wall.



From diagonals of one of the 4-unit squares, two 2½-unit squares are generated that form a double-square. Doubled in turn, to the right it generates a double-square that encompasses the fireplace/tool shed masonry wall; two squares more generated further to the right locate the fascia of the carport roof and the terminus of the extended carport wall. Multiplied to the left, the double-square forms a run that terminates neatly at the master bedroom exterior wall.

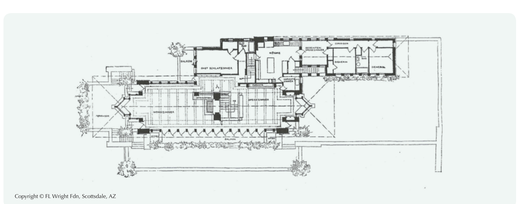


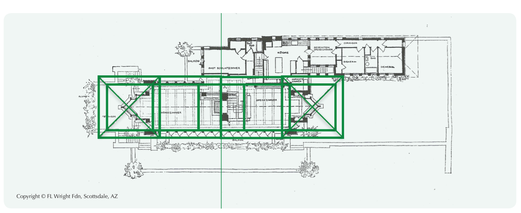
Finally, the whole fits neatly into three squares: a double-square envelopes the interior to the right of the projecting pier, and outlines the entry and carport roofs; a slightly diminished square encompasses the grass lanai.



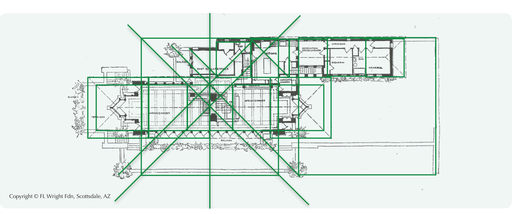
Final result: A work of architecture

The FREDERICK ROBIE HOUSE
One of the greatest of the Prairie Houses, the Robie House of 1906 combines a powerfully thrusting, energy-charged dynamism with perfect balance and rock-solid rootedness. The boldly cantilevered long roof is beautifully poised over the linear porch and its walled terrace and courtyard. But what law determines the reach of the cantilevers thrusting far enough to be dramatic but not so far as to seem foolish? The answer lies in the hidden geometry.





Two nested runs of squares dominate the organization. A run of four squares that fixes the proportions of the boldly cantilevered roof grows with concentric symmetry from a spine of five squares that determine the width of the living and dining rooms.



From the inner faces of the two outer squares in the 5-square run is generated a large square whose right and left ends bisect the heavy piers at the outer corners of the living and dining rooms and whose top and bottom faces encompass the rear bedroom wing and the front garden planters, creating a stable foundation about which the main living spaces symmetrically and dramatically unfold. Diagonals extending from the front garden planters lock the rear wing to the rest of the house. One diagonal fixes the rear balcony planter, and from the other is generated a square that in turn generates a string of squares outlining the bedroom wing. The right planter also touches the left lower corner of a large square that defines the service yard, completing the composition.

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