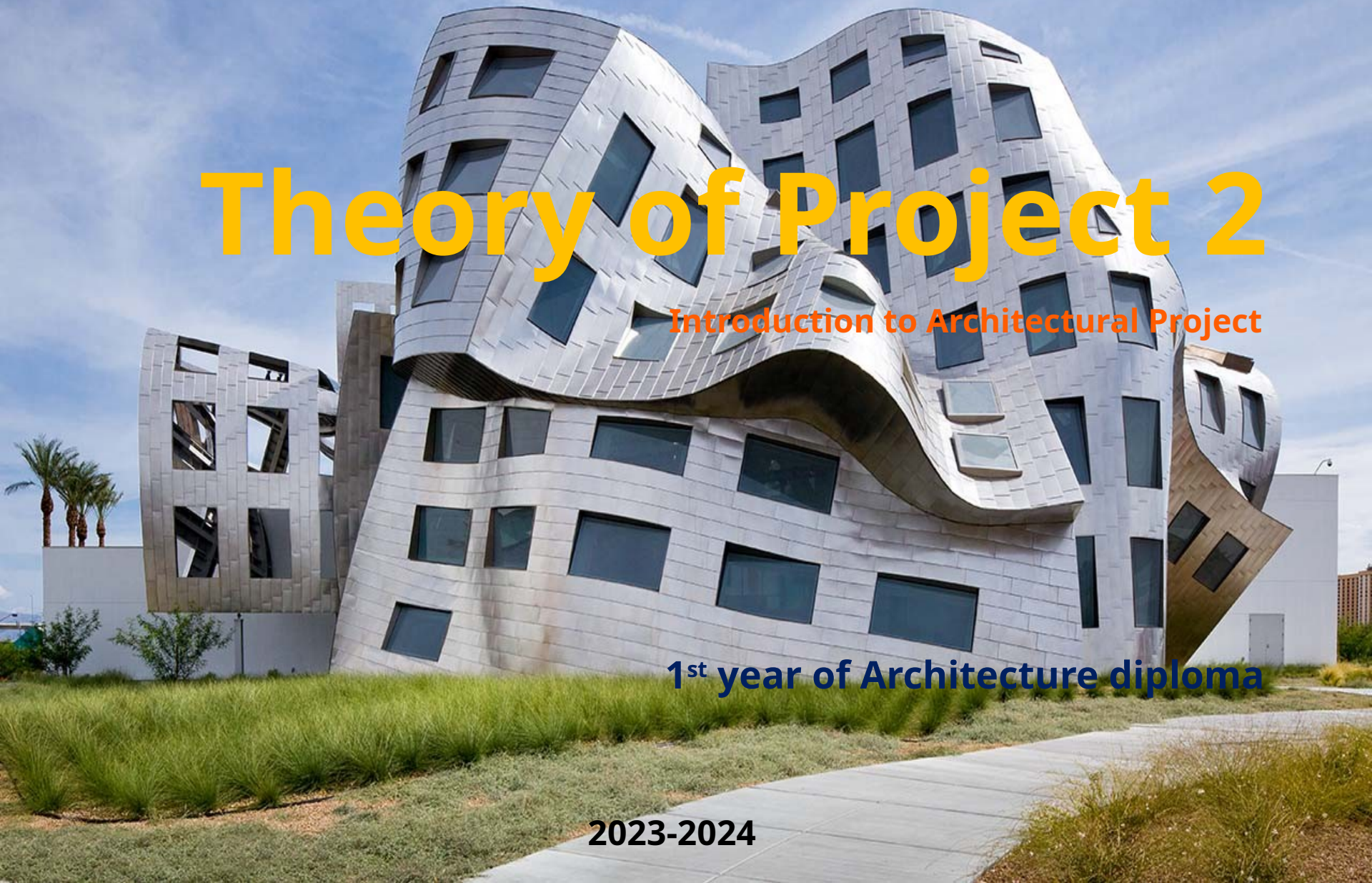
University of Biskra
Architecture Department



Theory of Project 2

Introduction to Architectural Project

1st year of Architecture diploma

2023-2024

Forms and transformations in Architecture

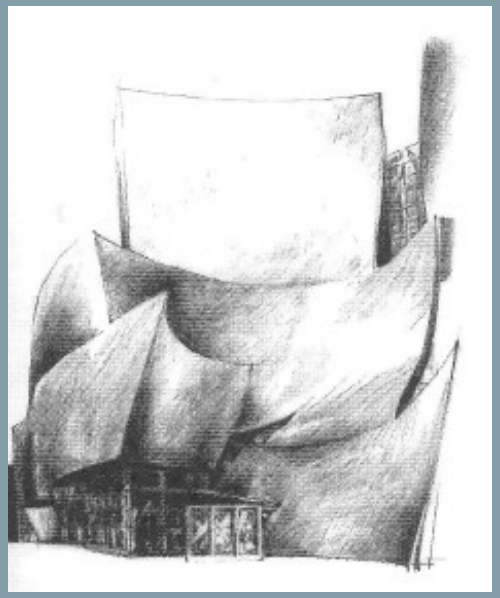
Architectural form is the point of contact between mass and space

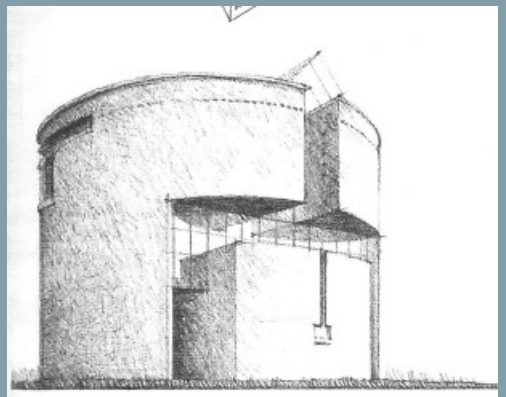
- Form is an inclusive term that can have several meanings:

1. **External/outer appearance of an object in general**
2. **External appearance of that object in a special condition (Ex. An object in movement)**

In Architecture it denotes the formal structure of a work

- The way of arranging and coordinating between the elements of a composition





House at Stabio, Switzerland, 1981, Mario Botta

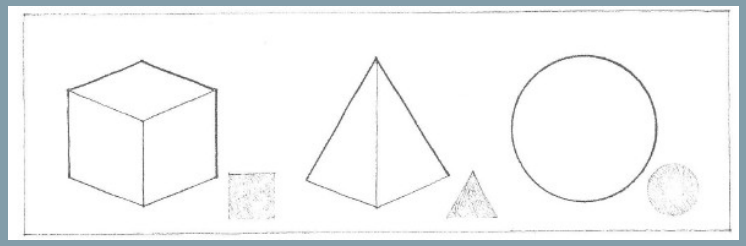
¬ʌThe form is characterized by:

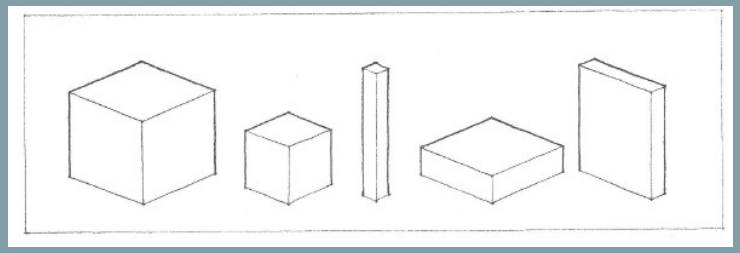
1.The shape

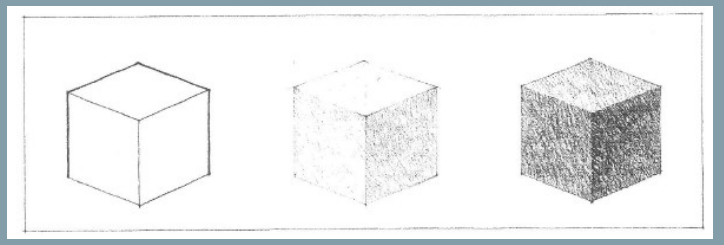
2.Dimension

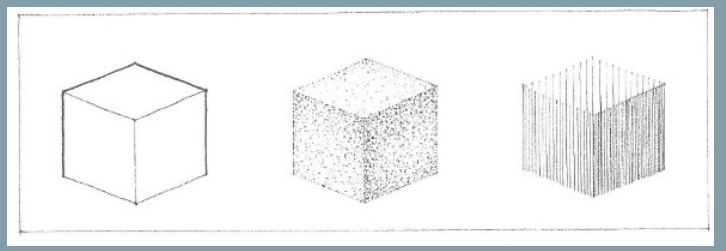
3.The colour

4.The texture



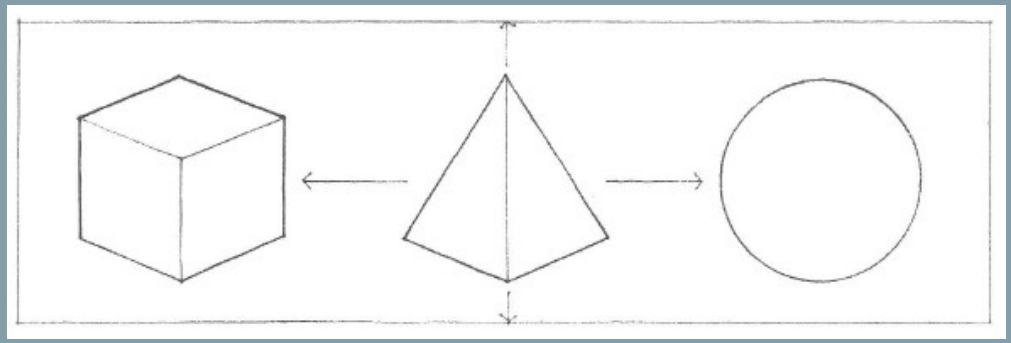






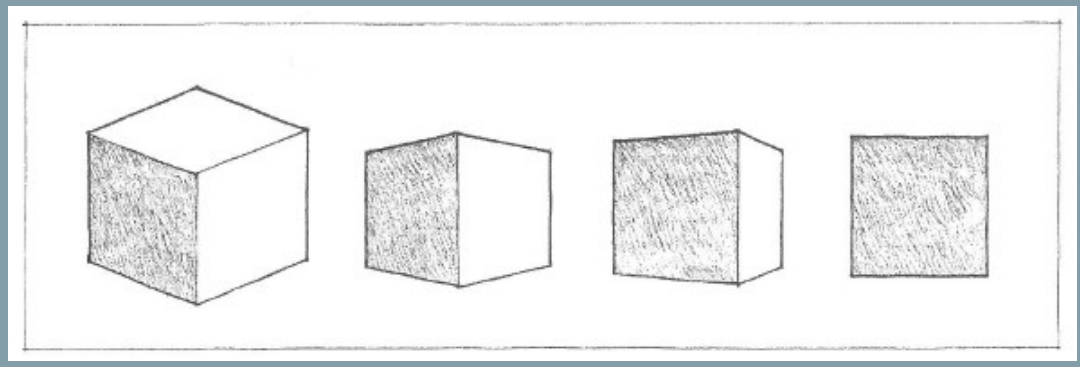
5.The position

- Environment



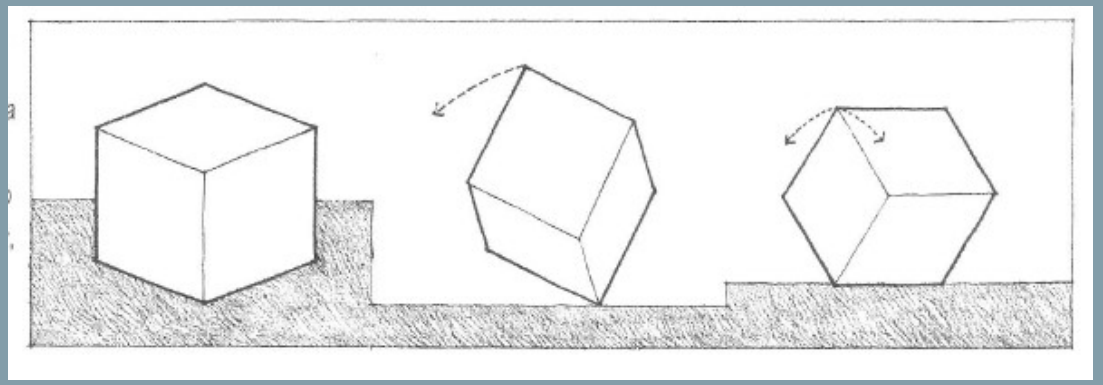
6.Orientation

- Land plan
- Other forms
- Perception



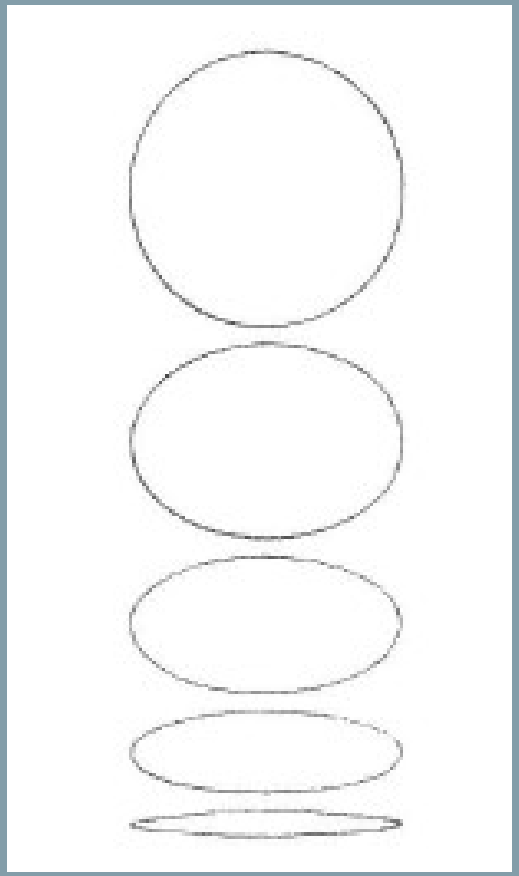
7.Visual Inertia

- Stability/Ground Plane
- Force of gravity
- Visual perception



All these properties essentially depend on: the conditions of perception

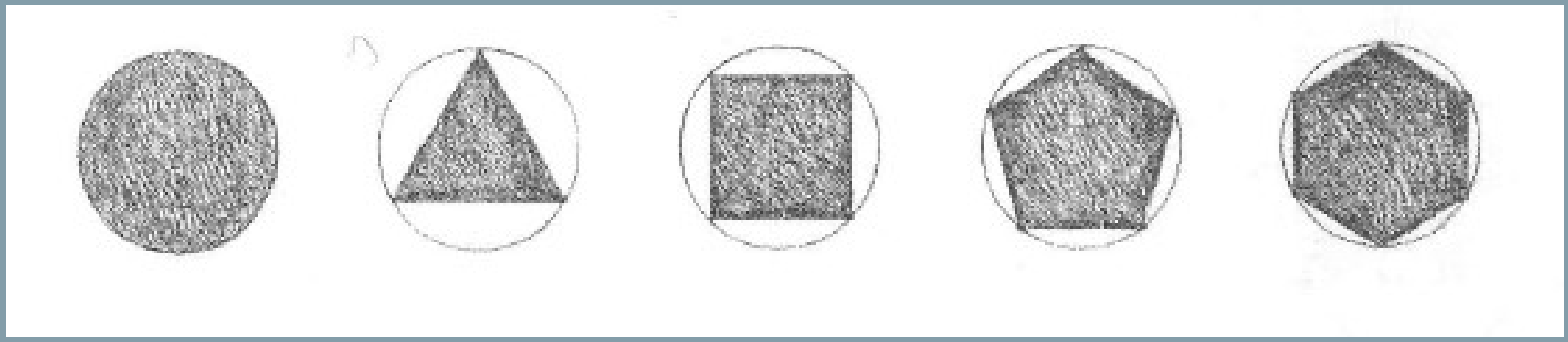
- Perspective angle
- Distance/shape
- Light conditions
- or lighting
- The nearby environment



Regular Geometric Shapes

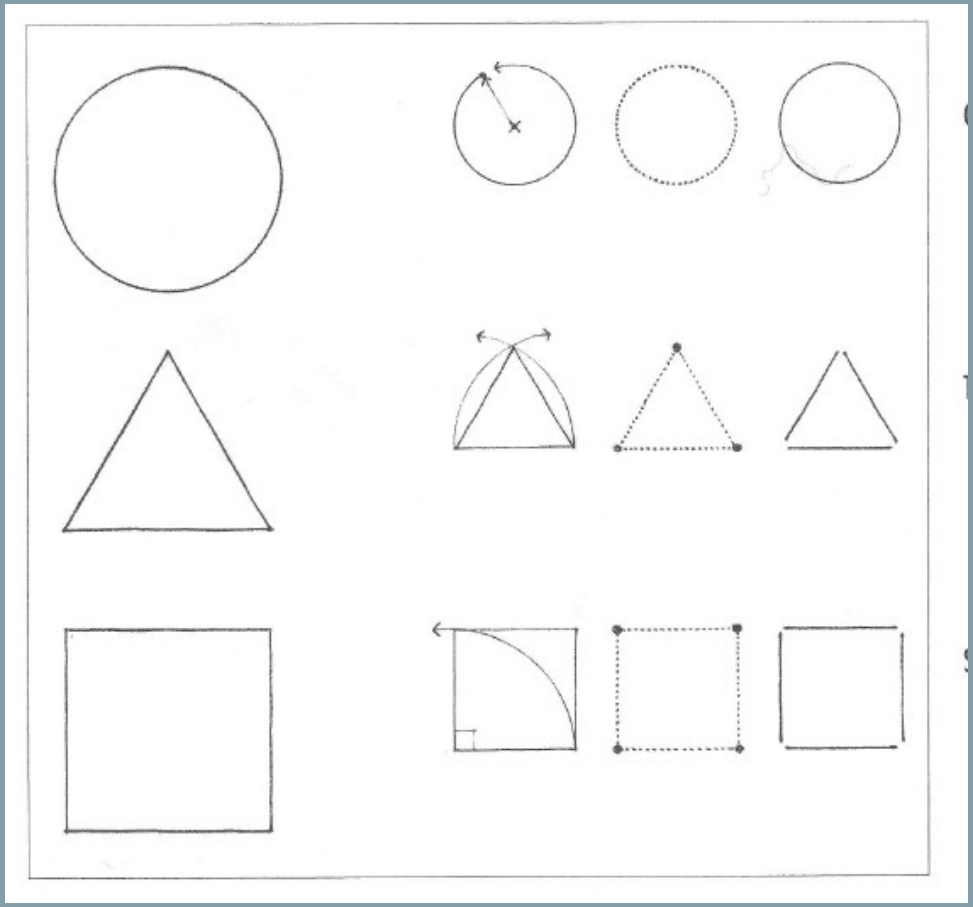
According to modern psychology, the human mind tends to simplify its immediate environment in order to recognize it

In geometry, regular shapes all derive from the circle where we can inscribe an infinity of regular polygons.

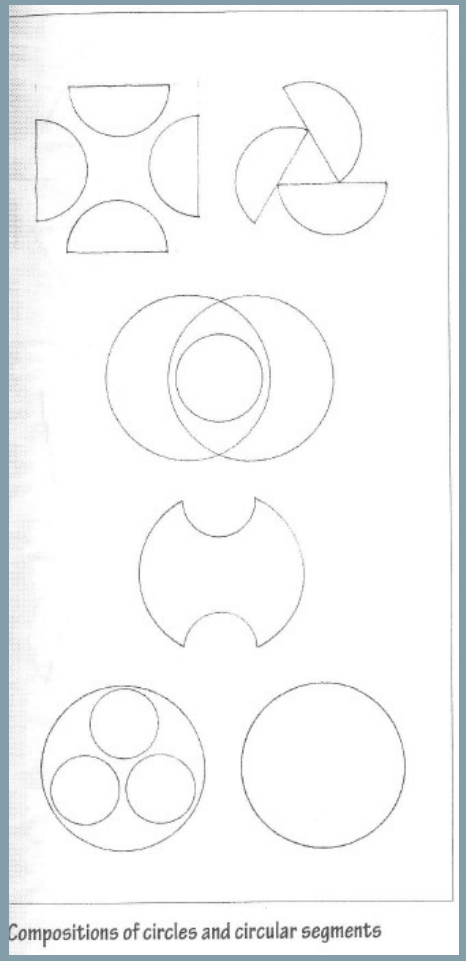


The best known and recognized regular forms are:

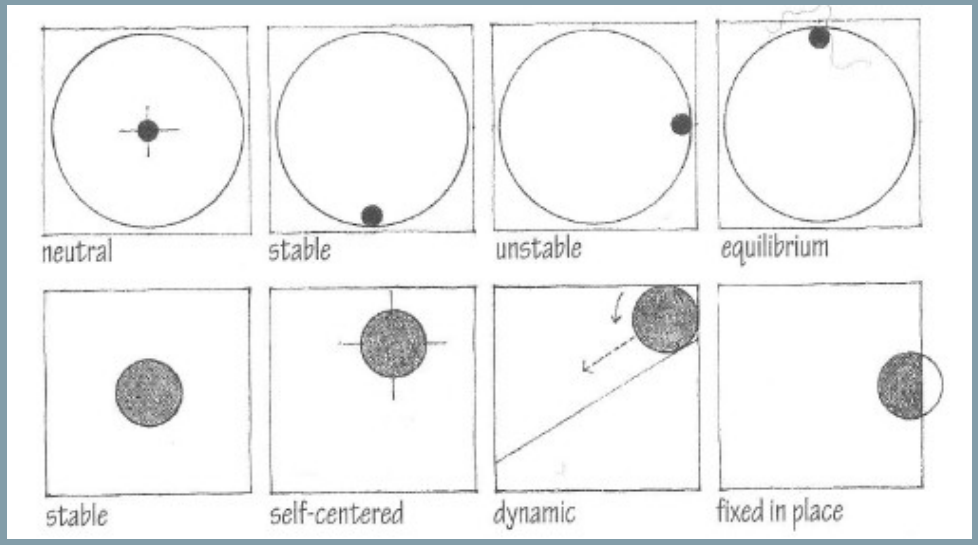
- The circle
- The triangle
- The Square

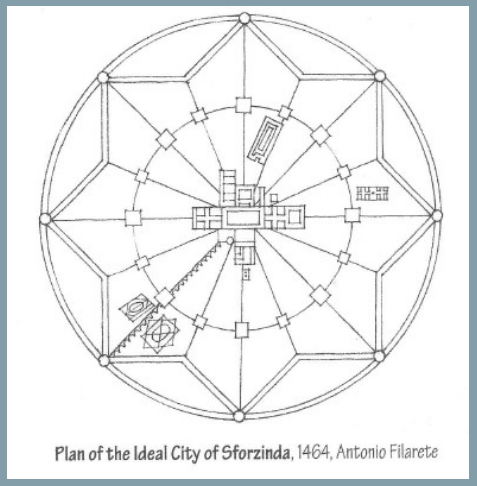


The circle



Compositions of circles and circular segments

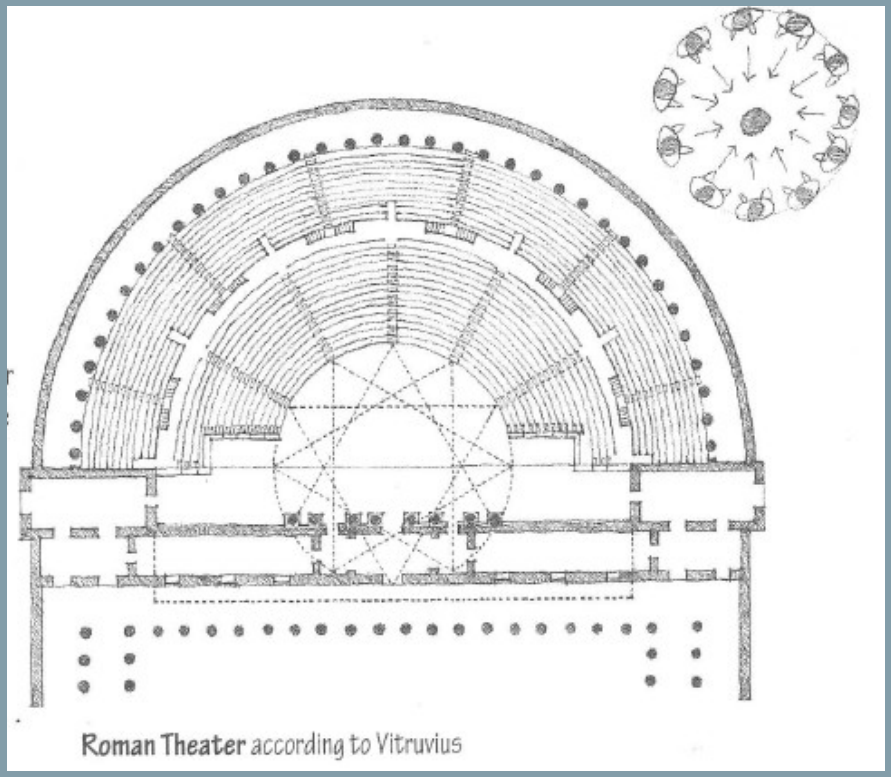




Plan of the Ideal City of Sforzinda, 1464, Antonio Filarete

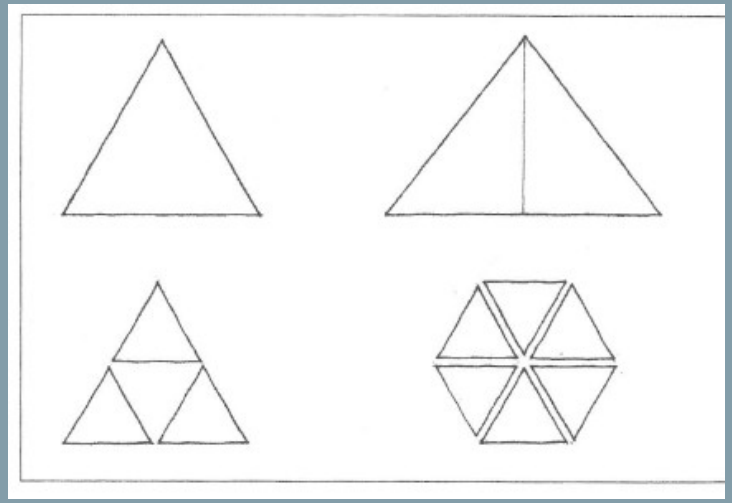
- The circle is:
- Centralized
- Introvert
- Stable

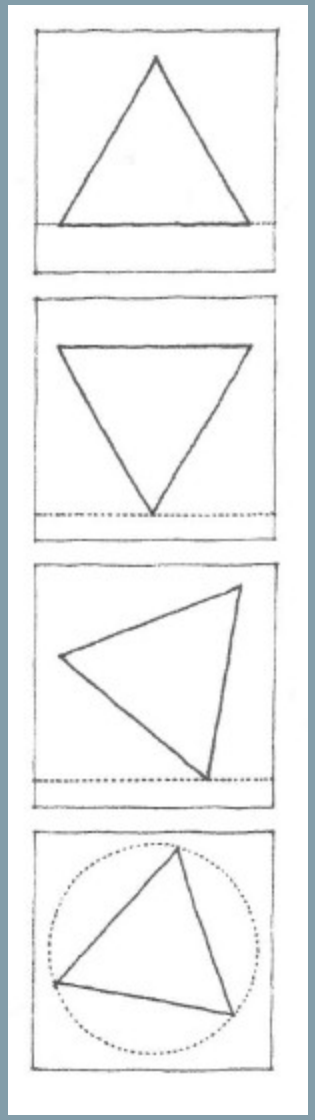
- Placed with linear and or angular elements gives the circle dynamics and movement

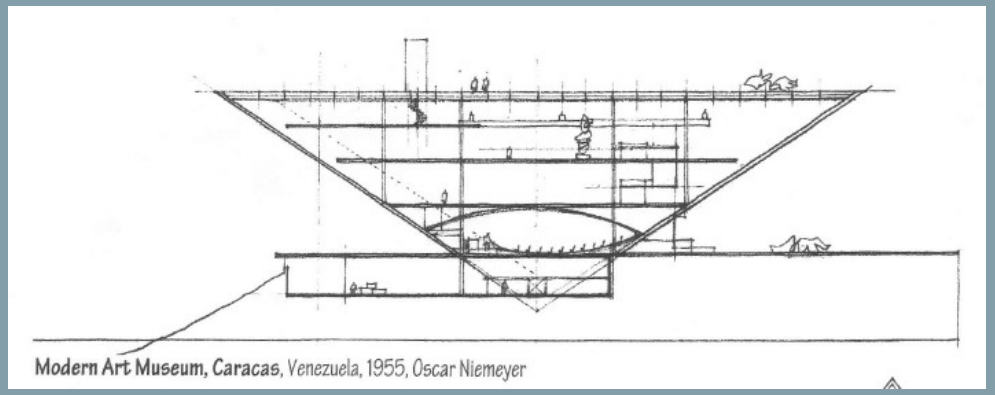


The triangle

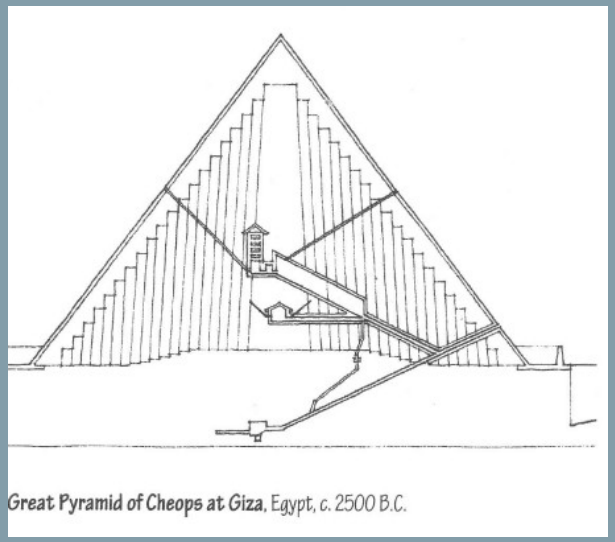
- The triangle means:
- Stability
- Rigidity
- Firmness
- Direction



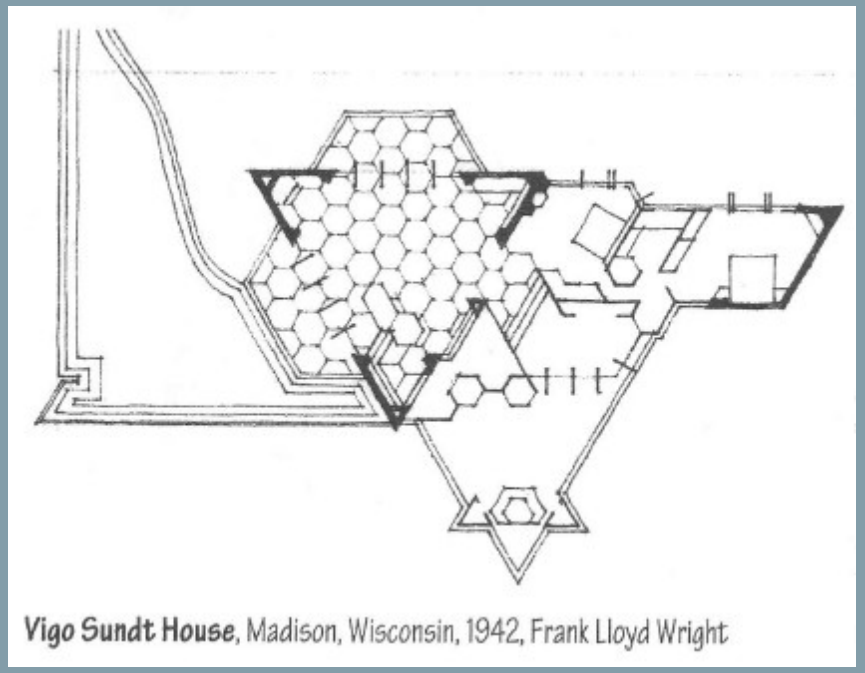




Modern Art Museum, Caracas, Venezuela, 1955, Oscar Niemeyer



Great Pyramid of Cheops at Giza, Egypt, c. 2500 B.C.



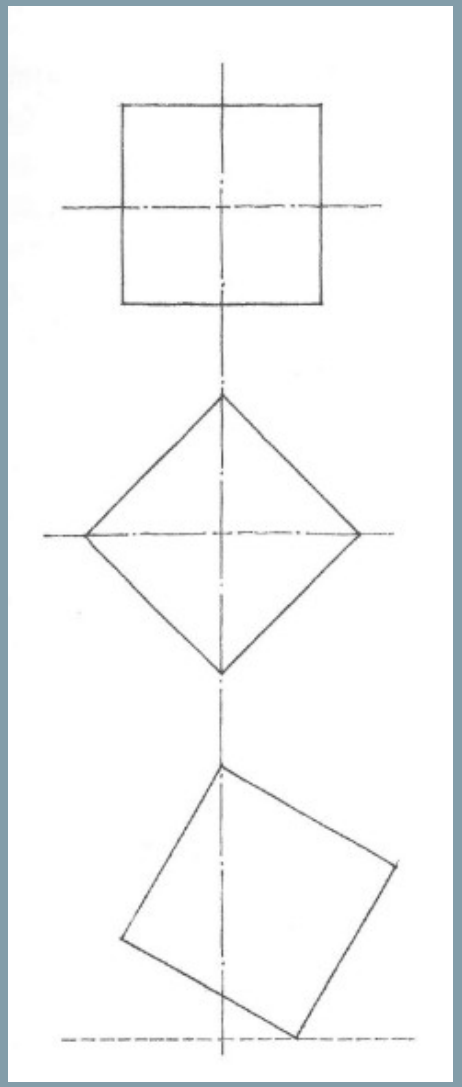
Vigo Sundt House, Madison, Wisconsin, 1942, Frank Lloyd Wright

The square

- Bilaterally symmetrical

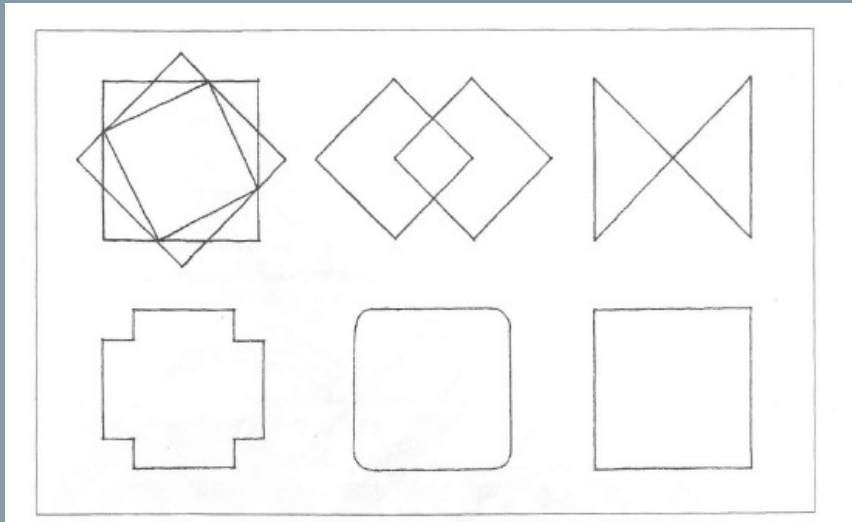
- Represented
- The Pure
- The Rational

- He can be:
- Stable
- Dynamic

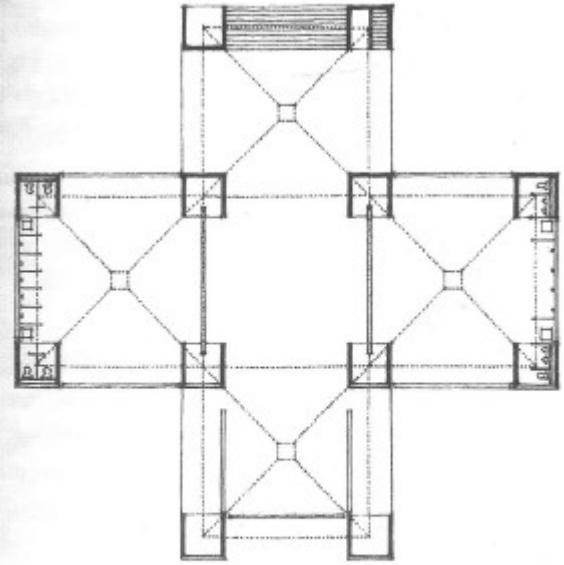


The square

The square defines perfect equilibrium states



Compositions resulting from the rotation and modification of the square



Bathhouse, Jewish Community Center, Trenton, New Jersey, 1954–59, Louis Kahn

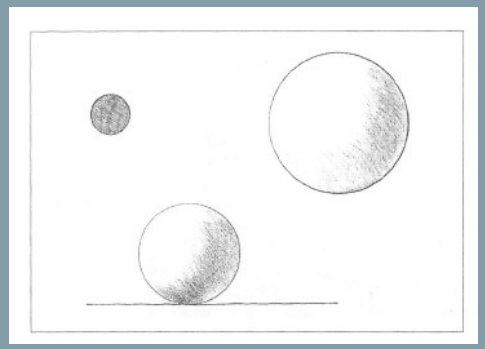
From Form to Solid

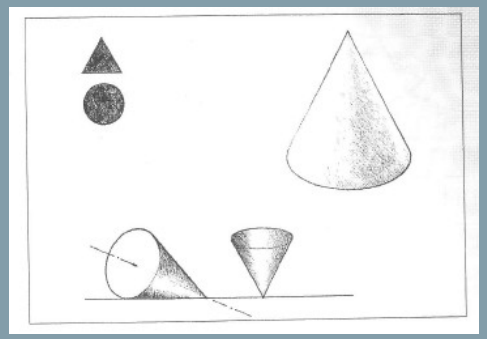
cubes, cones, spheres, cylinders or pyramids are the first shapes revealed by light, their images are distinct and tangible and without ambiguity. They are thus the most beautiful shapes.

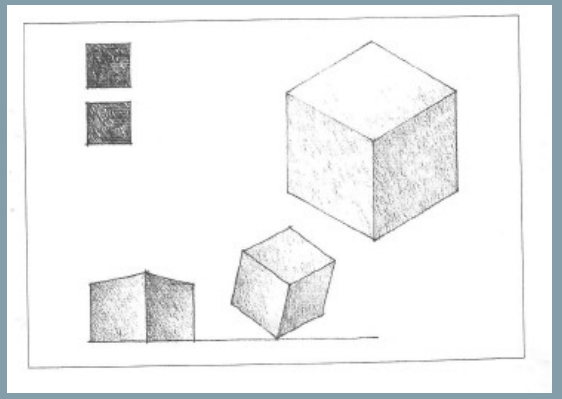
Le Corbusier

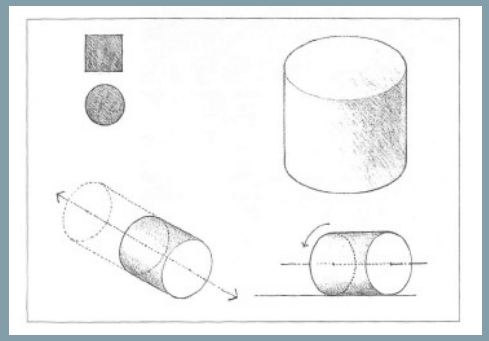
Regular shapes generate volumetric or *solid shapes*

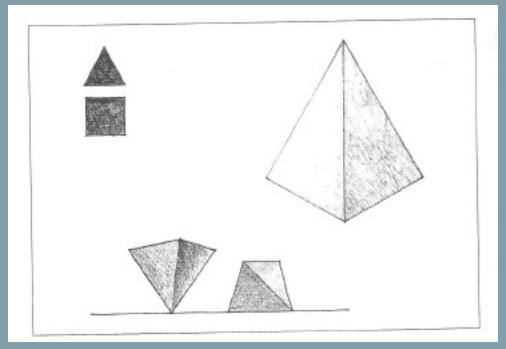
- The circle generates spheres and cylinders
- Triangles generate cones and pyramids
- Squares generate cubes



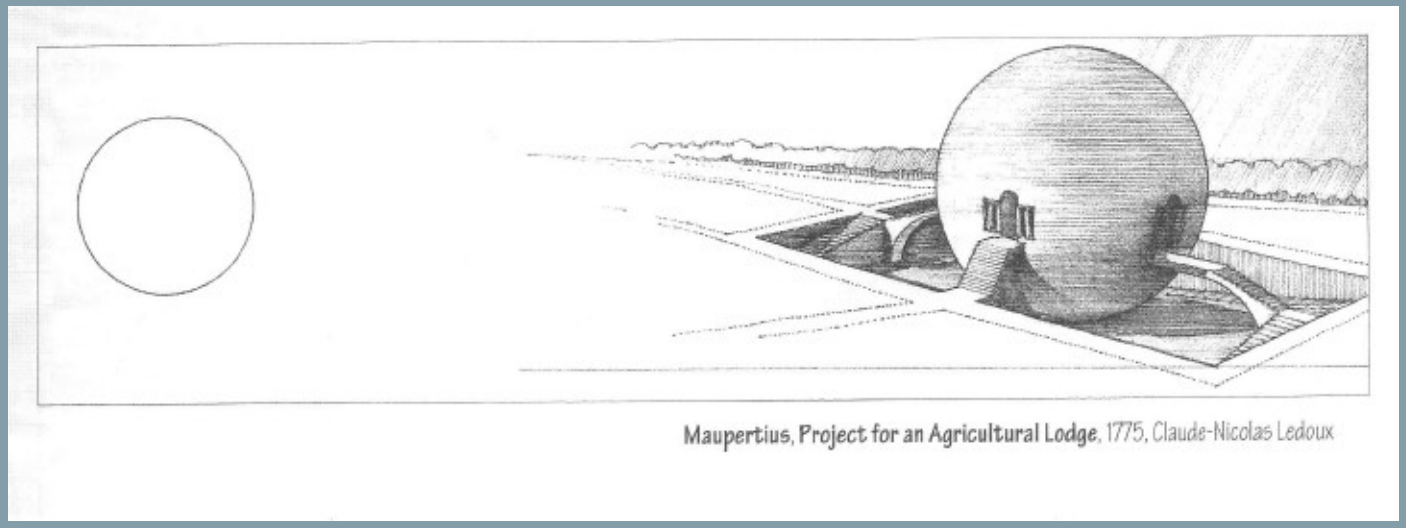




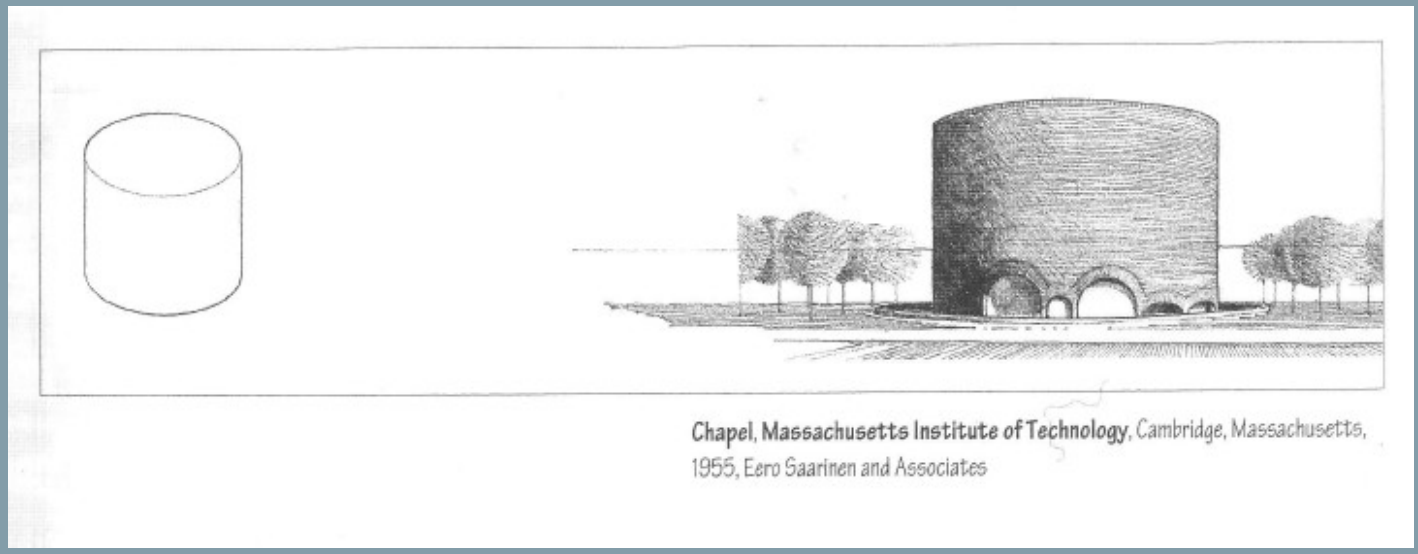




Examples of Architecture Projects

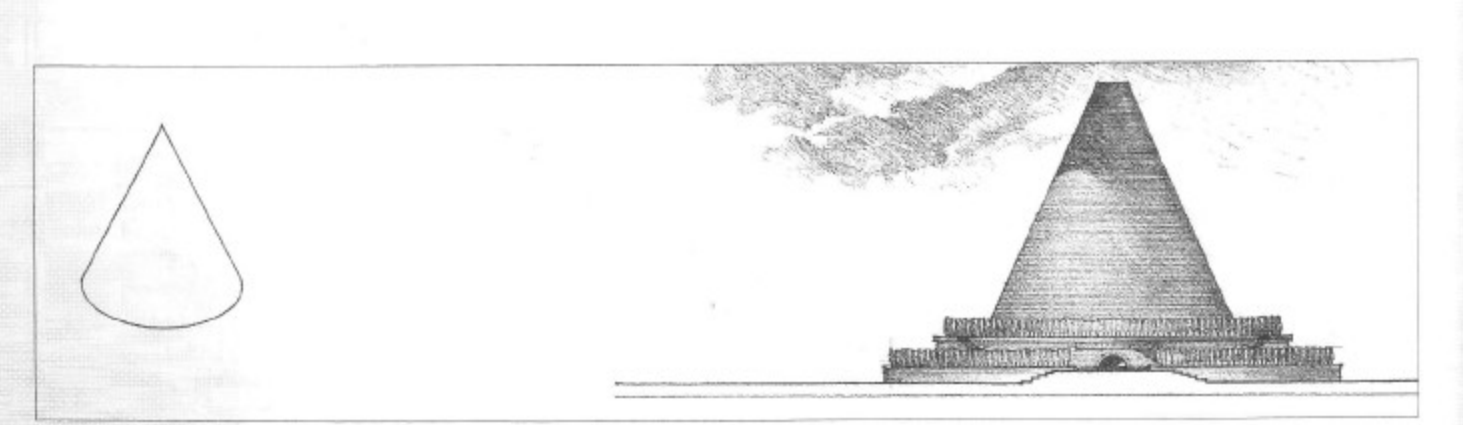


Maupertius, Project for an Agricultural Lodge, 1775, Claude-Nicolas Ledoux

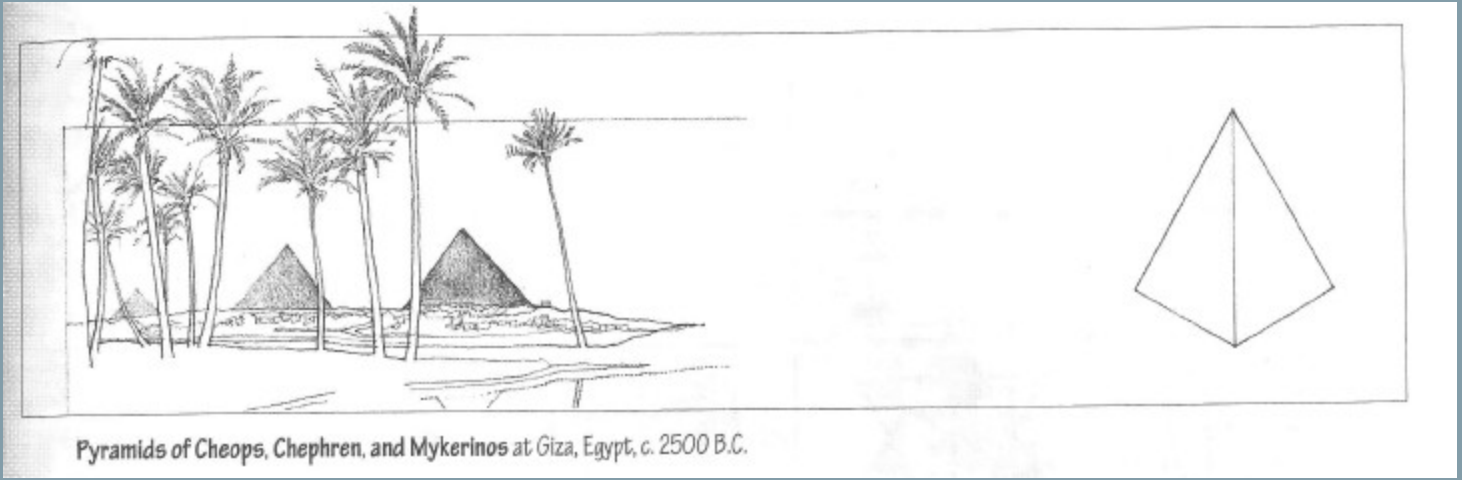


Chapel, Massachusetts Institute of Technology, Cambridge, Massachusetts, 1955, Eero Saarinen and Associates

Examples of Architecture Projects

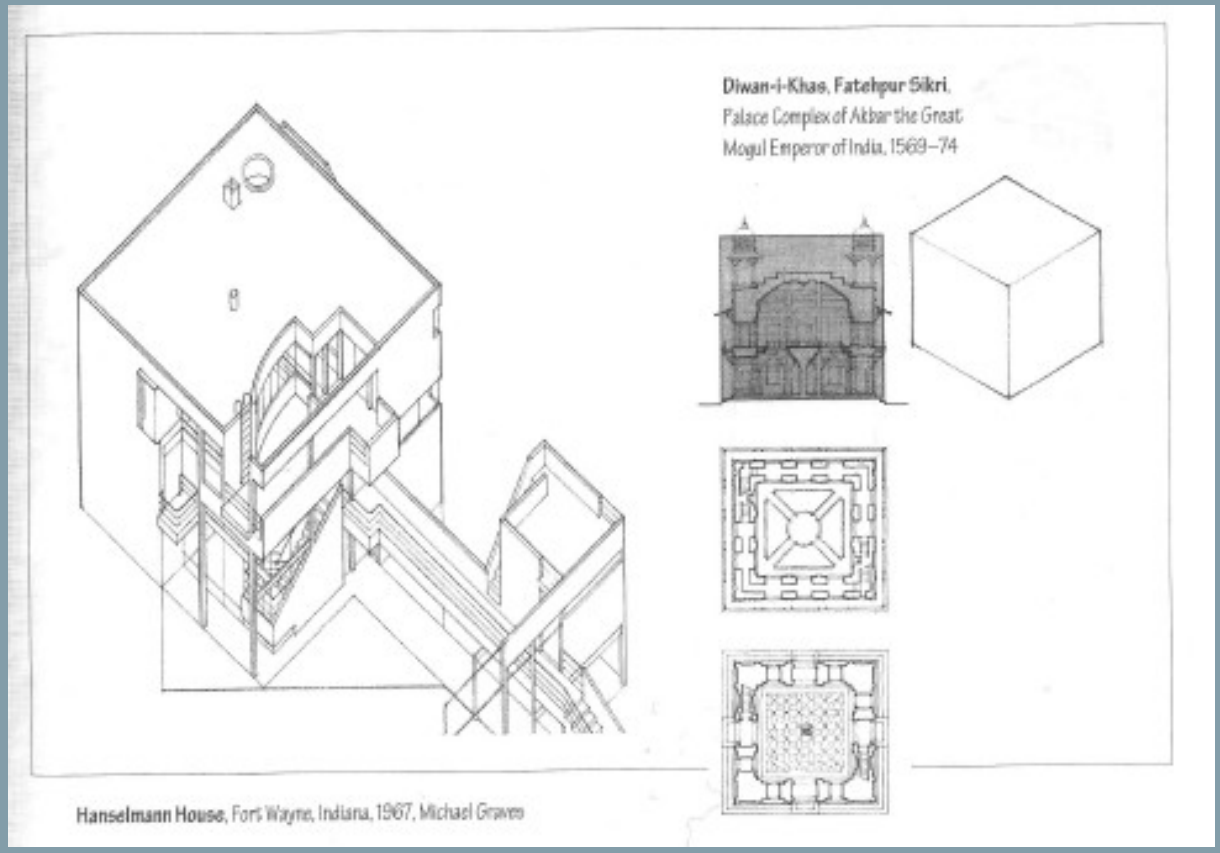


Project for a Conical Cenotaph, 1784, Étienne-Louis Boulée



Pyramids of Cheops, Chephren, and Mykerinos at Giza, Egypt, c. 2500 B.C.

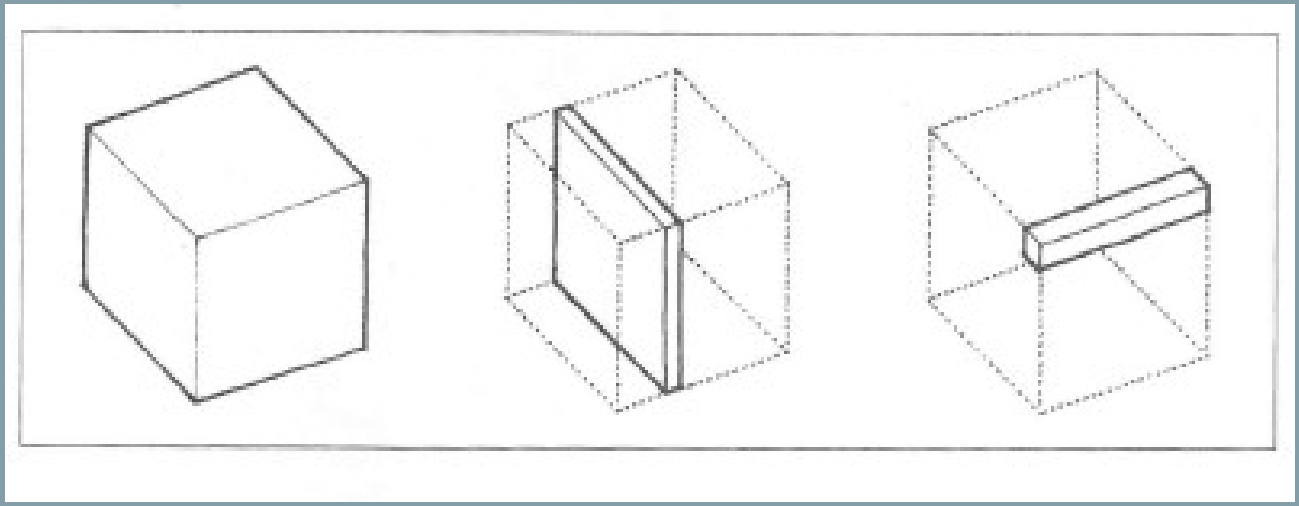
Examples of Architecture Projects



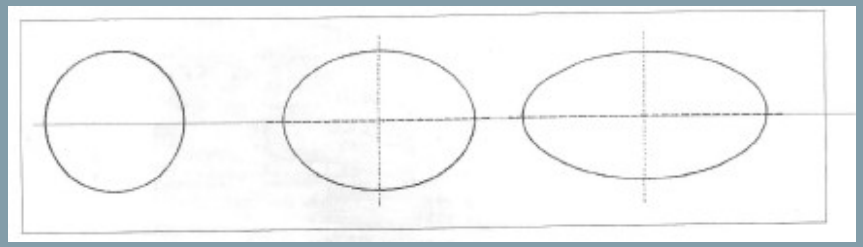
Shapes and Transformations

¬ٱAll shapes can undergo transformations generated by manipulations of one or more dimensions

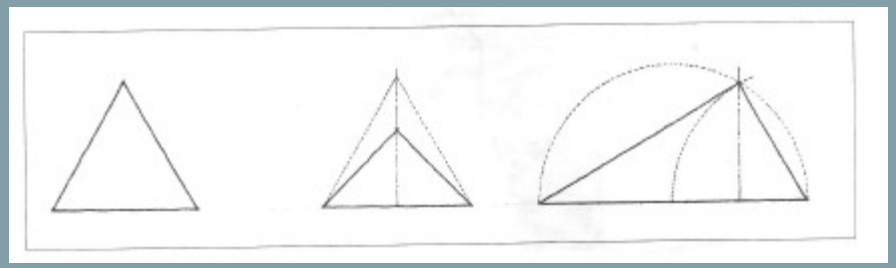
1. Dimensional transformation
2. *Addition transformation* of elements
3. *Subtraction transformation* of elements



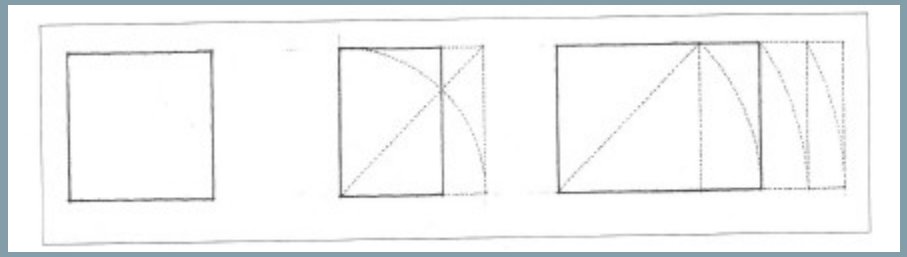
Dimensional Transformation



- Sphere in different ellipsoidal shapes by elongation of its main axis

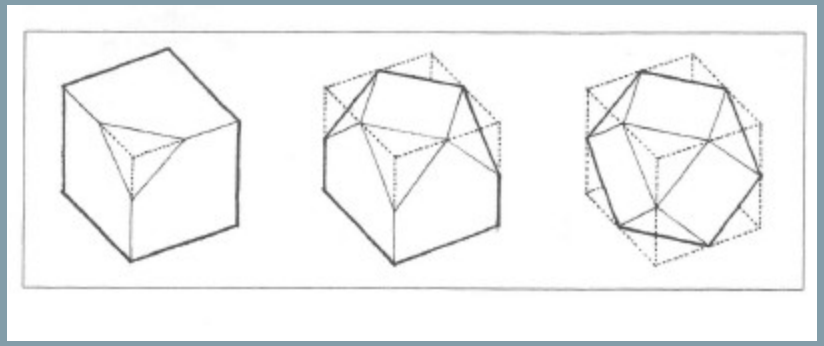


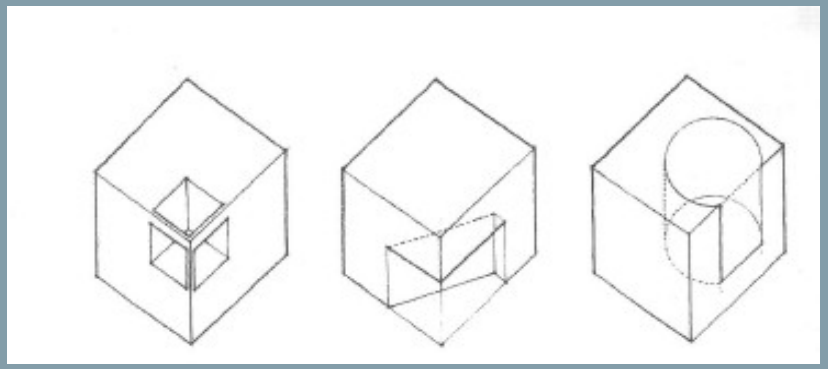
- Pyramid by altering its base, modifying the height of the apex

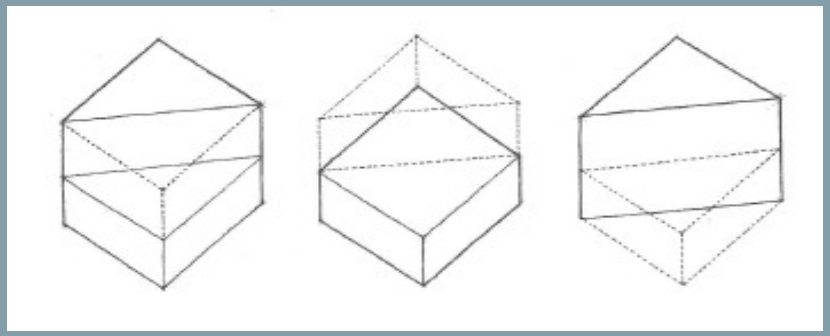


- Cube made of similar prisms by lengthening or reducing its Width Length Depth

Subtractive Transformation

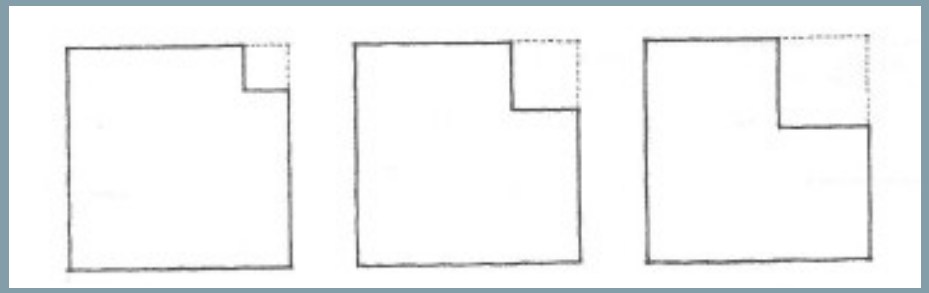




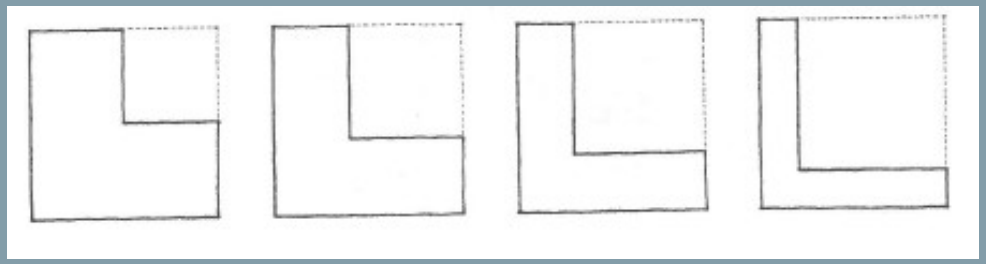


- Simple or Complex Subtraction
- Simple Geometric Shapes Easily Adapt to Transformation
- Quite pronounced results

Subtractive Transformation

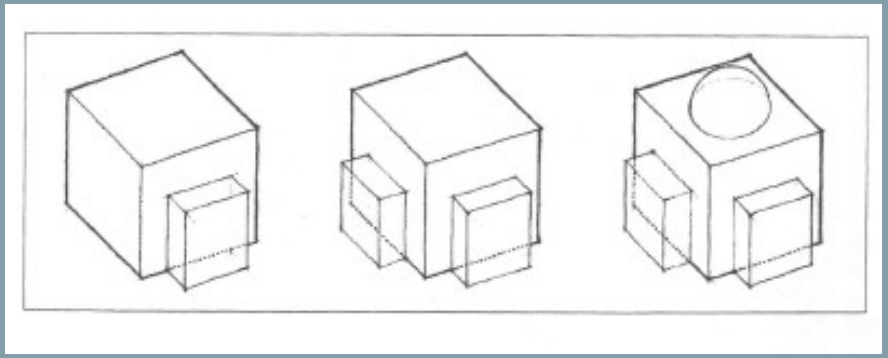


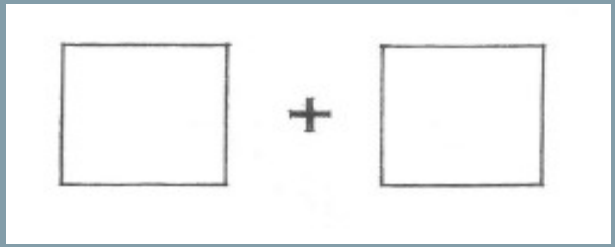
- Subversive abstraction
- 2 Rectangles or L Shape?



¬ʎ*Additive transformation*

Additive Transformation

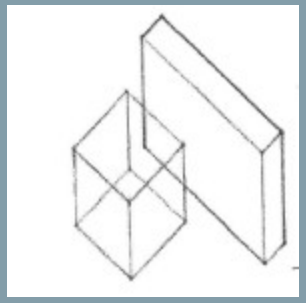




- Simple or Complex addition
- Simple Geometric Shapes Easily Adapt to Transformation
- Quite pronounced results

Examples

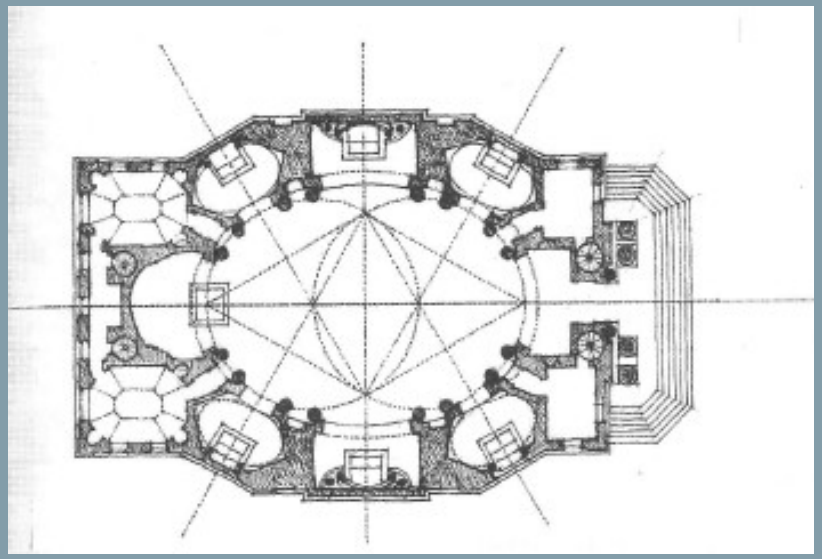
- Dimensional Transformation of a Cube into a Vertical Bar:



- Housing Unit Firminy-Vert France Le Corbusier 1963-1968

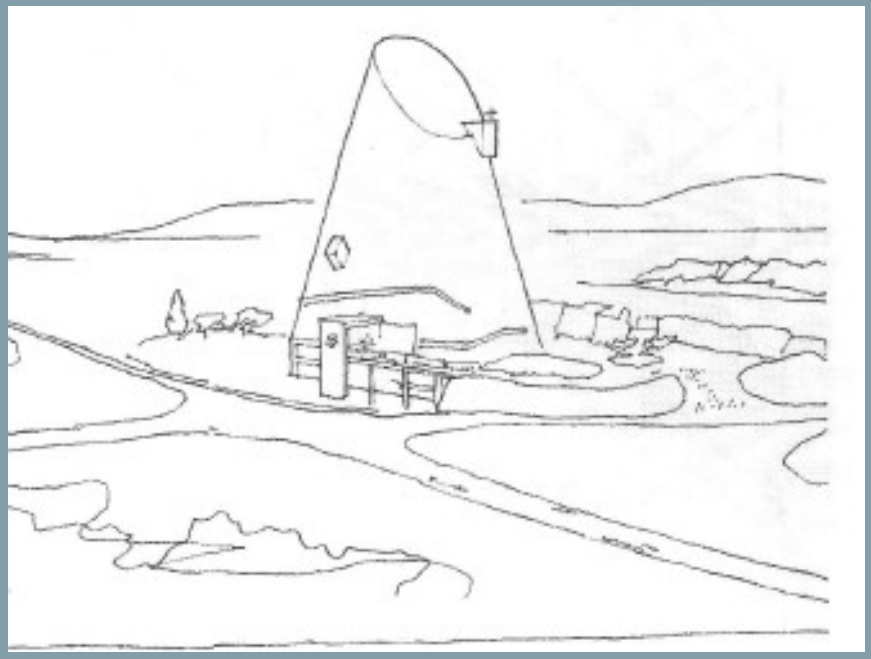
Examples

- Elliptical plan of a church
- Pensioro Della Chiesa
- 17 Century
- Francisco Borromini



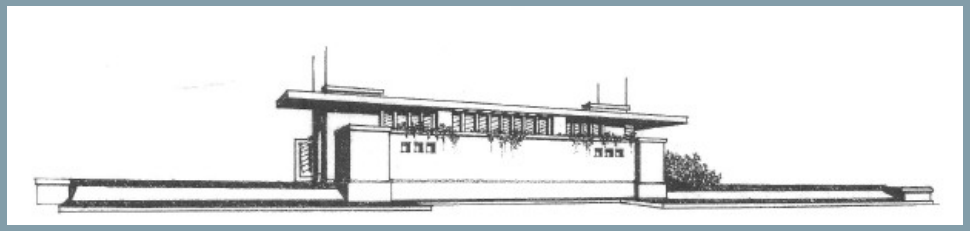
Examples

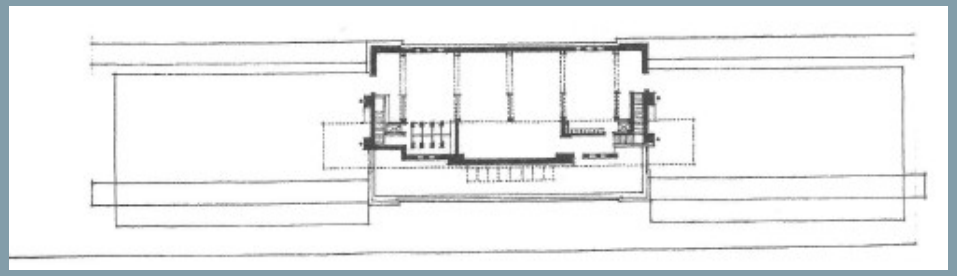
- Saint Pierre
- Firminy-Vert France
- Le Corbusier 1965



Examples

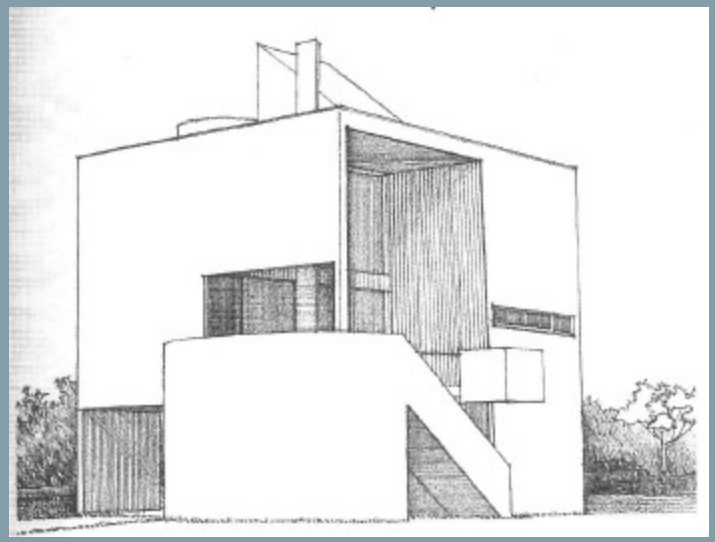
- Yahara Boat Club
- Madison Wisconsin USA
- Frank Lloyd Wright 1902

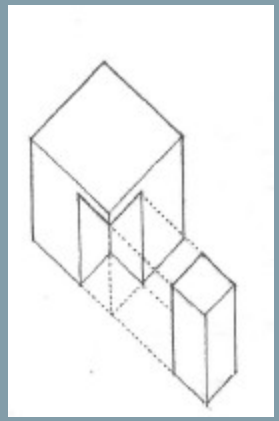




Examples

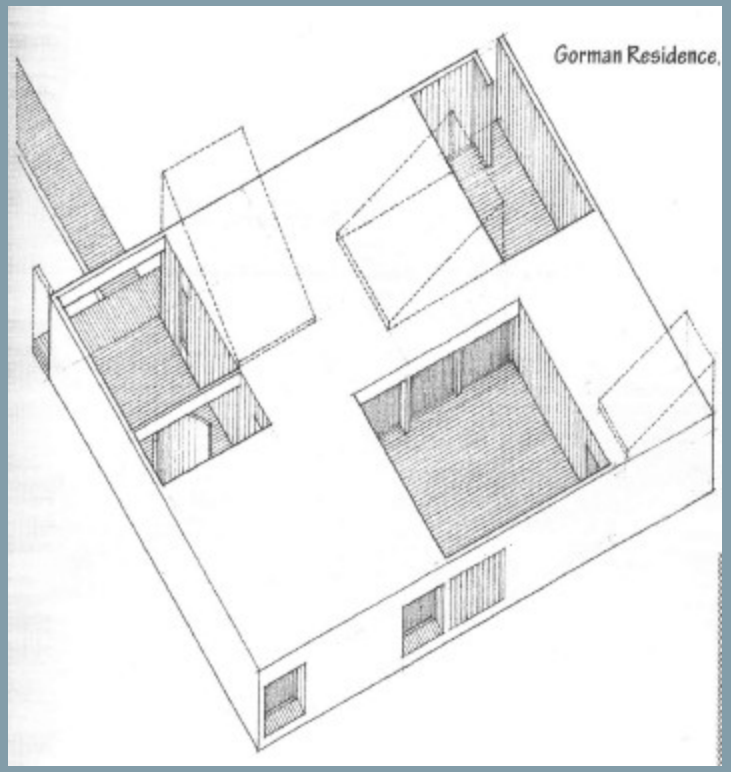
- Subtractive Transformation creating the volumes of space
- Gwathmey Residence New York USA Charles Gwathmey 1967





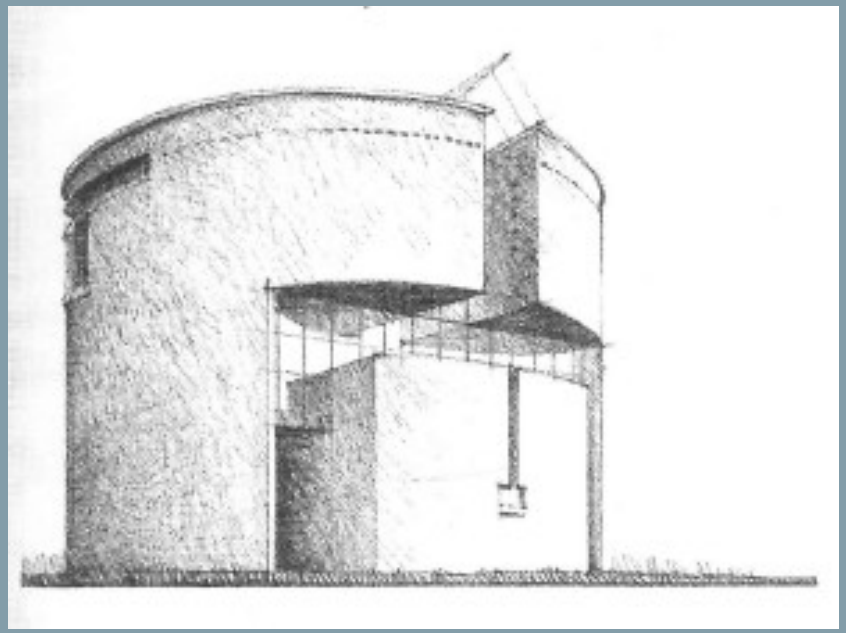
Examples

- Subtractive Transformation creating the volumes of space
- Gorman Residence New York USA Barabara Neski1968



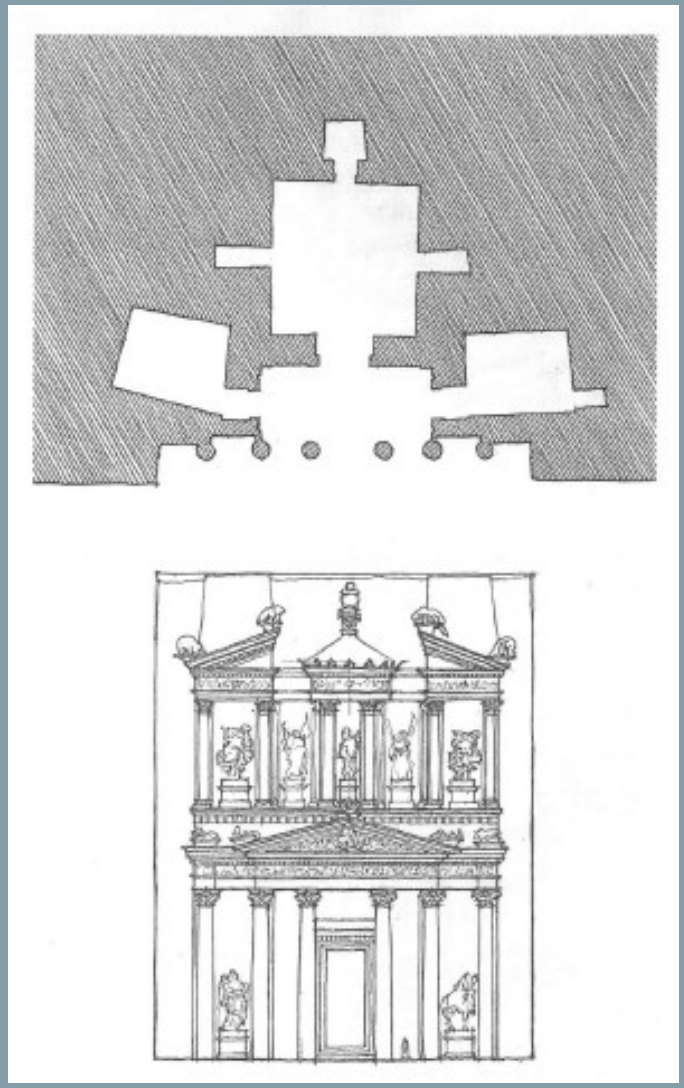
Examples

- Subtractive Transformation creating the volumes of space
- House in Stabio
- Swiss
- Mario Botta1981



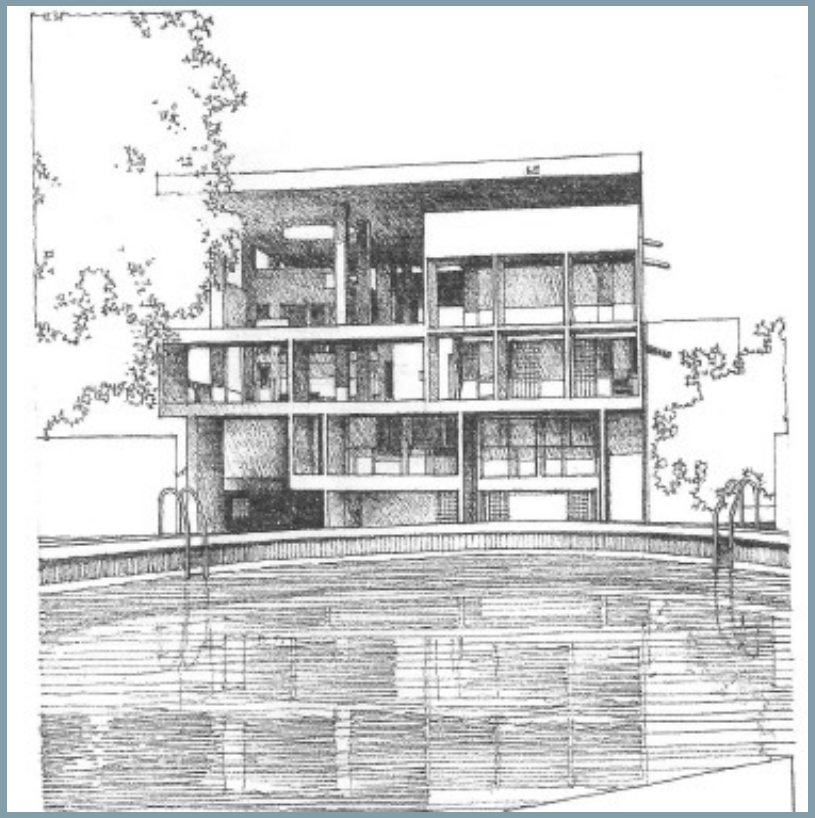
Examples

- Subtractive Transformation creating the volumes of space
- Khesnah Al Faroun
- Pietra Jordan
- 1st Century



Examples

- Subtractive Transformation creating the volumes of space
- Shodhan House
- Ahmedabad India
- Le Corbusier 1956

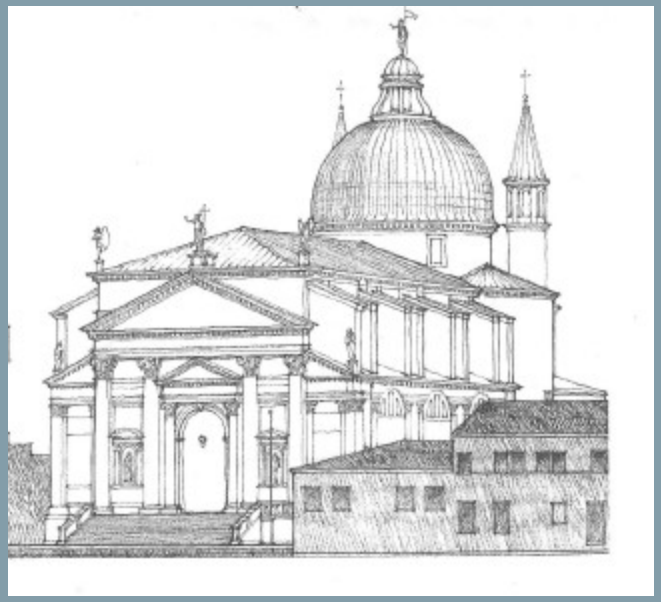


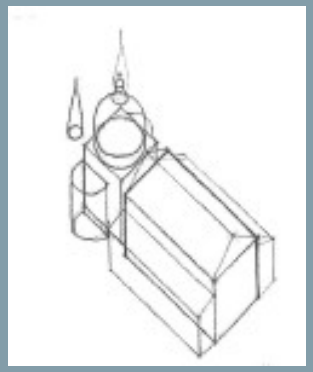
Examples

- Subtractive Transformation creating the volumes of space
- The Bennaceraf House
- Princeton New Jersey USA
- Michael Graves 1969

Examples

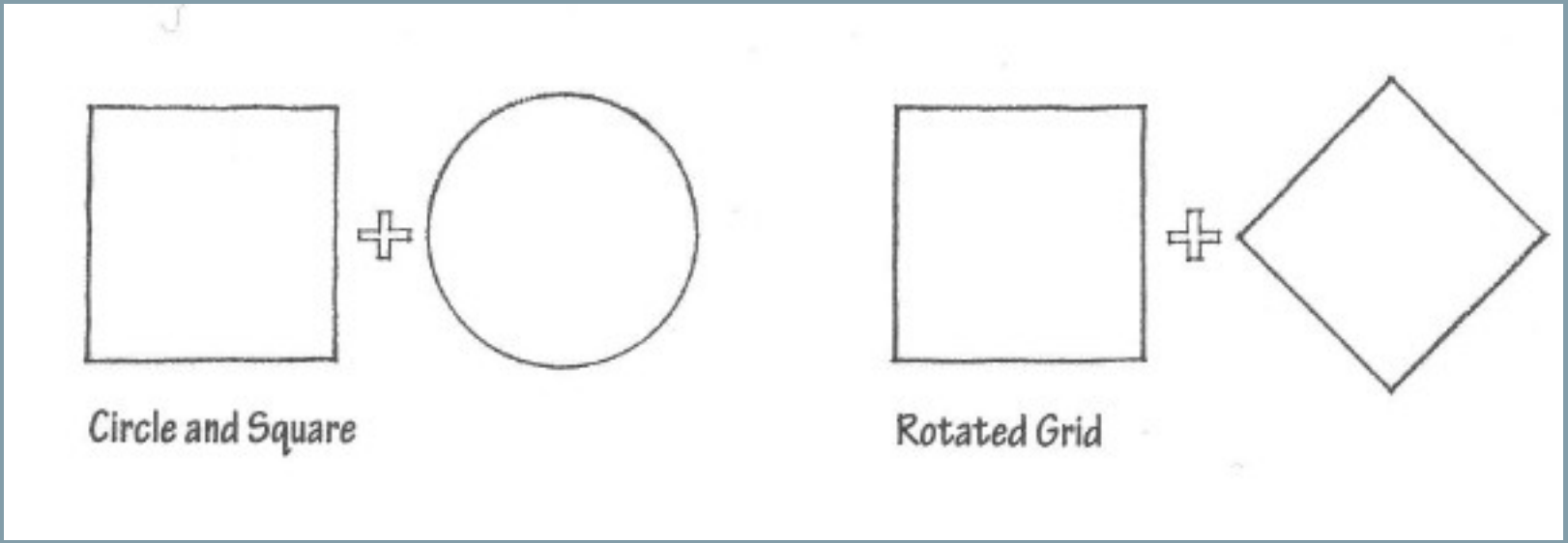
- Additive Transformation
  Attachment to the parent form of subordinate parts
- Redentore Venice Italy
- Andrea Palladio
- 1577-1592



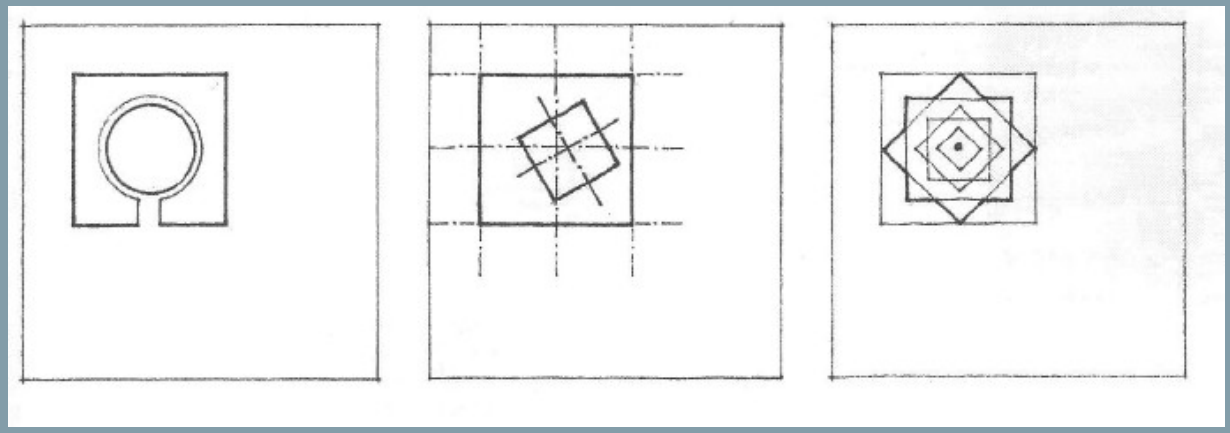


Geometric Shapes and Transformations

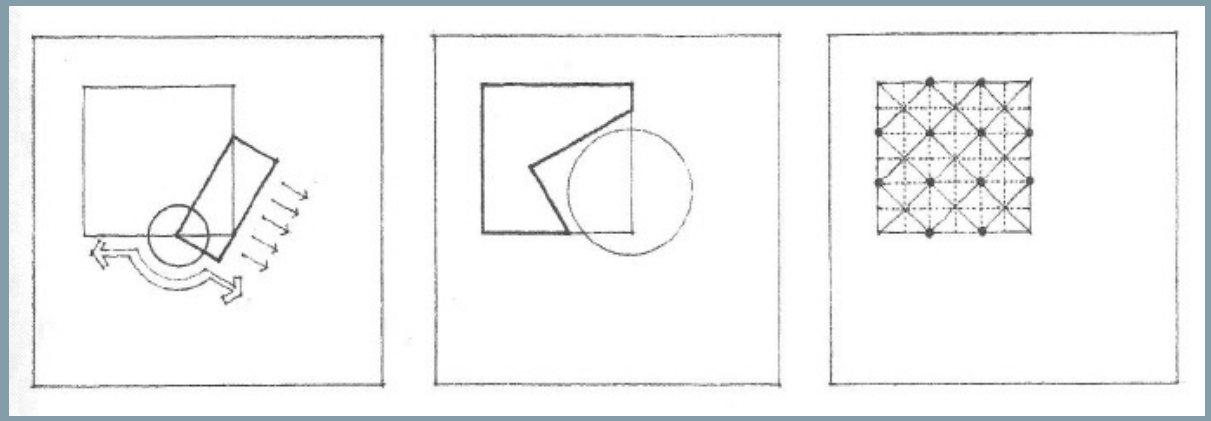
- When two shapes different in geometry and orientation interact and go beyond the limits of each.
  - *Each shape tries to dominate the whole composition*



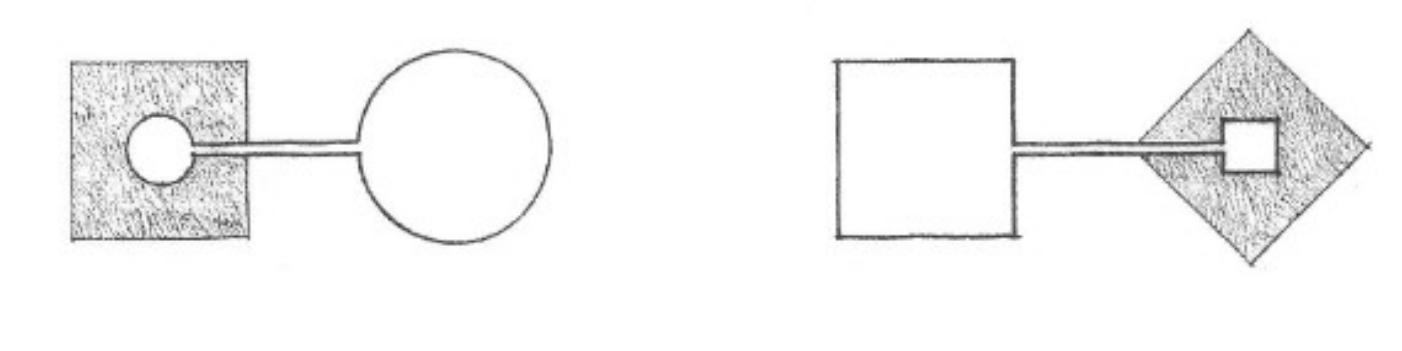
- The two initial forms lose their identity and create a new composite

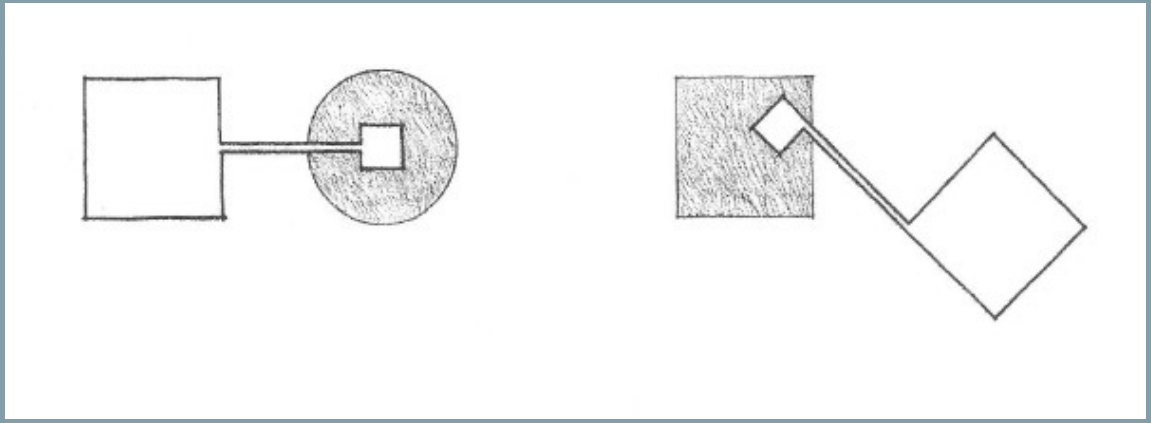


- The two shapes can retain their initial identities and share the intersection portion of their respective volumes

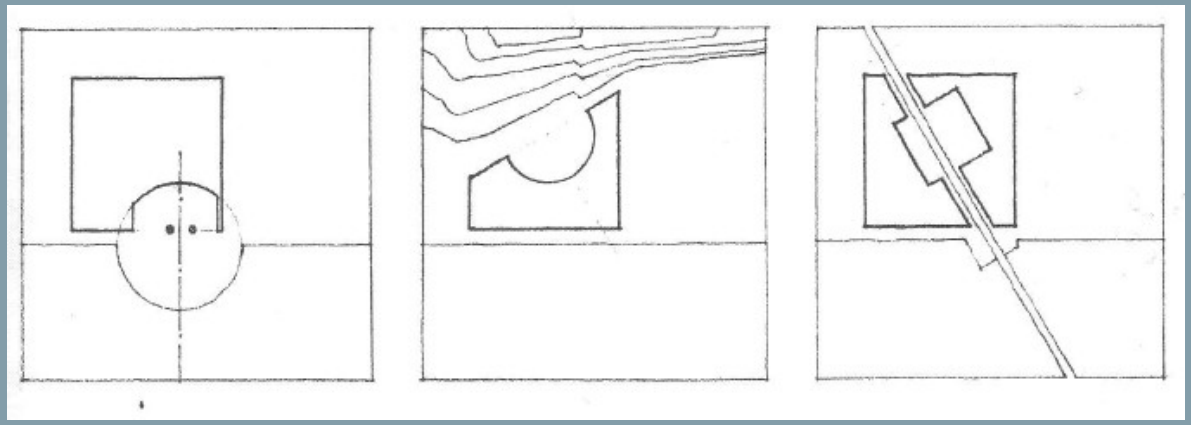


- The two forms can remain separated but connected by a third element of identity resulting from one of the initial forms.



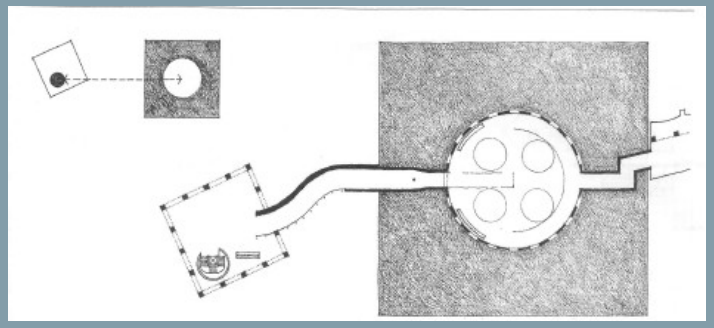


- One of the initial forms can completely accommodate the second in its volume

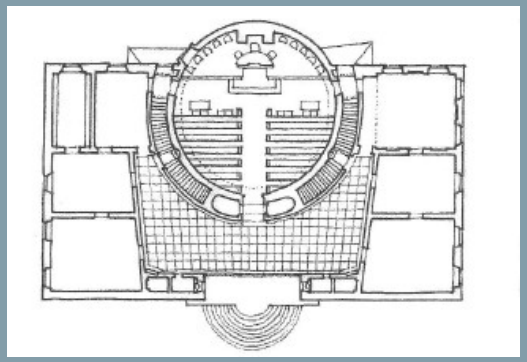


Examples

- *North Rhine Museum Germany*
  James Sterling 1975

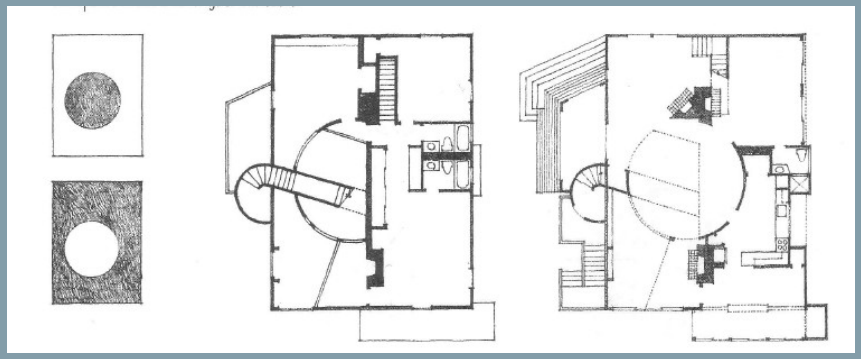


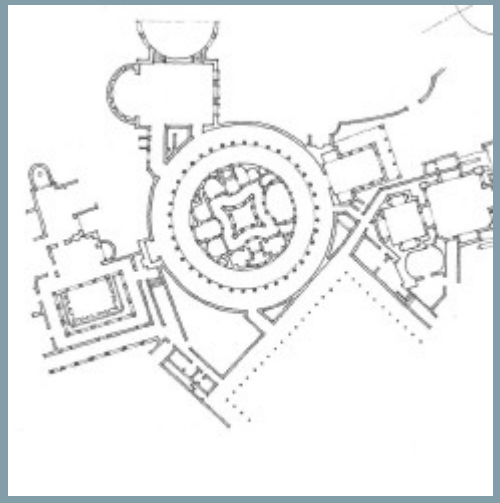
- *Court of Justice Sweden*
  Gunnar Asplund1917

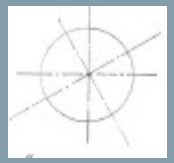


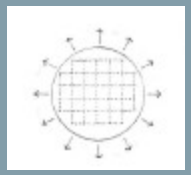
Examples

- *Murray House Massachusetts USA*
  Moore1969

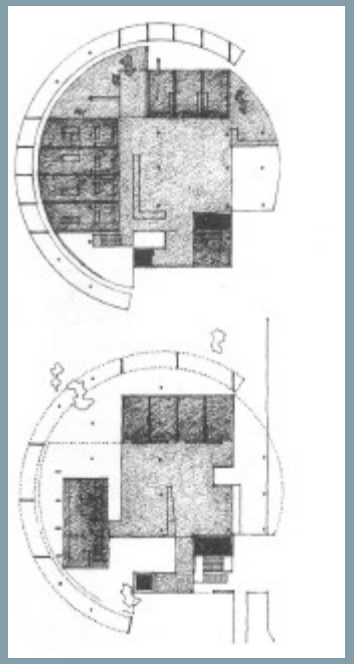








- *The villa on the island of Italy*
  Tivoli 118

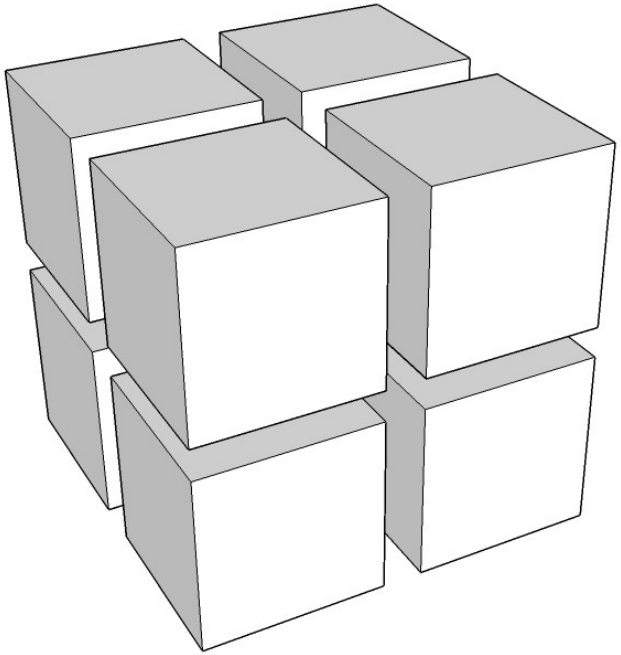


- *Embassy of France Brasilia Brazil*
  Le Corbusier 1964

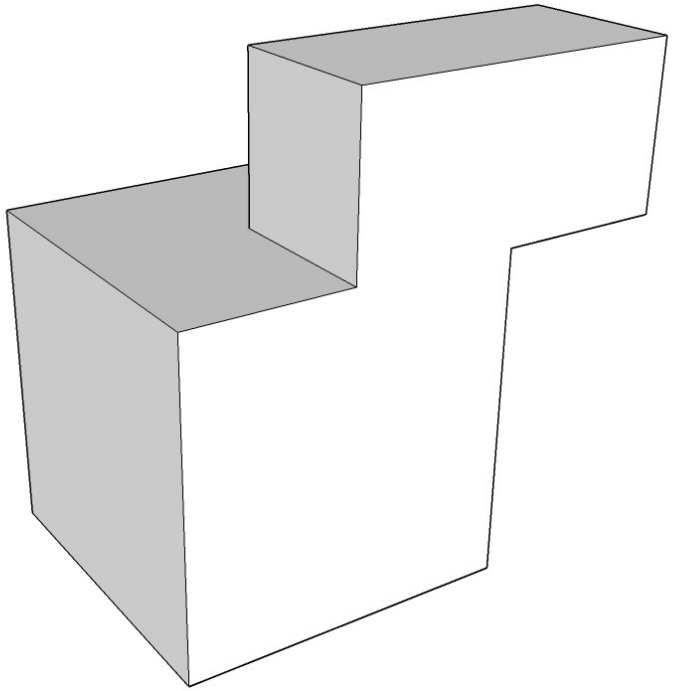
Applications of some geometric Transformations

Quelques outils de manipulation de la forme :

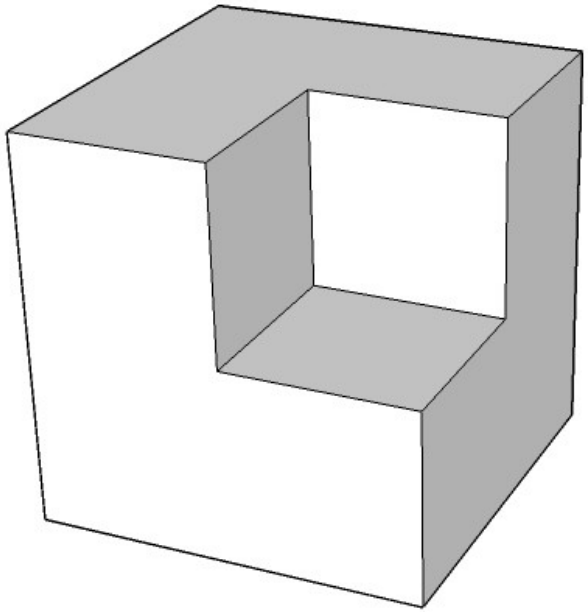
- Division :



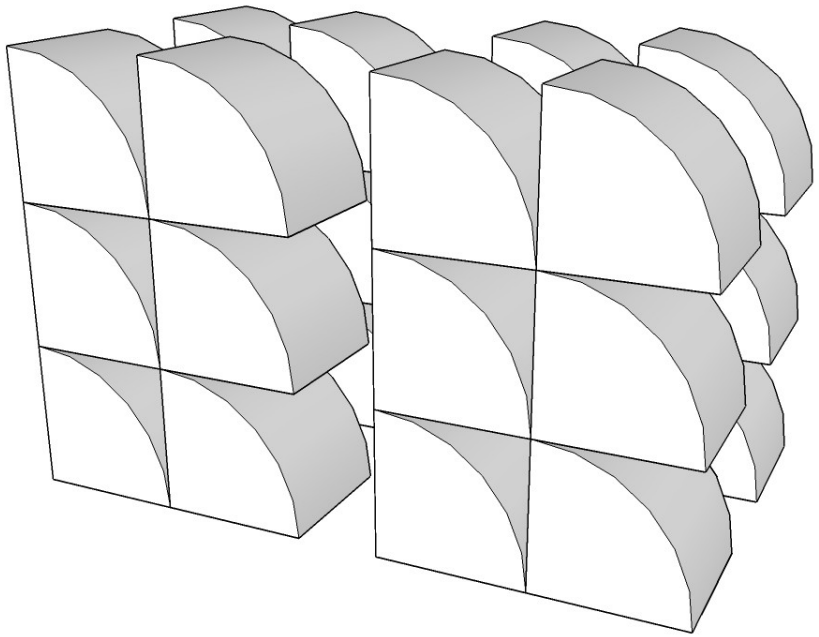
- Addition :



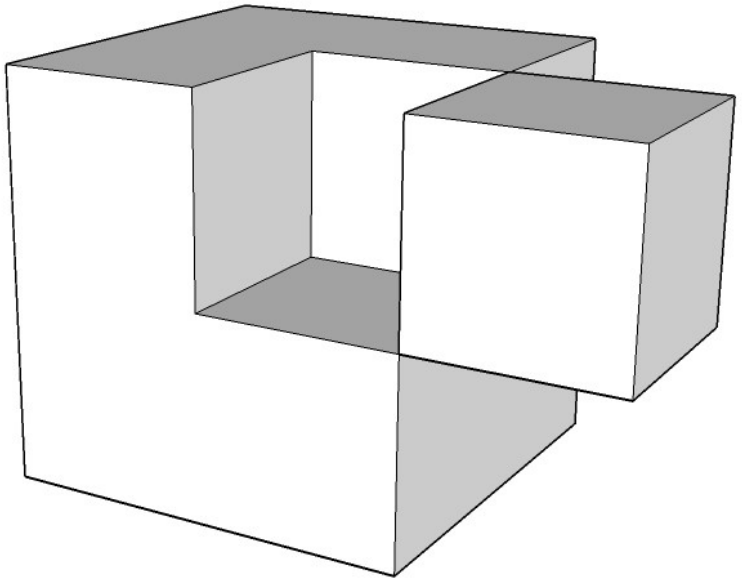
Soustraction,



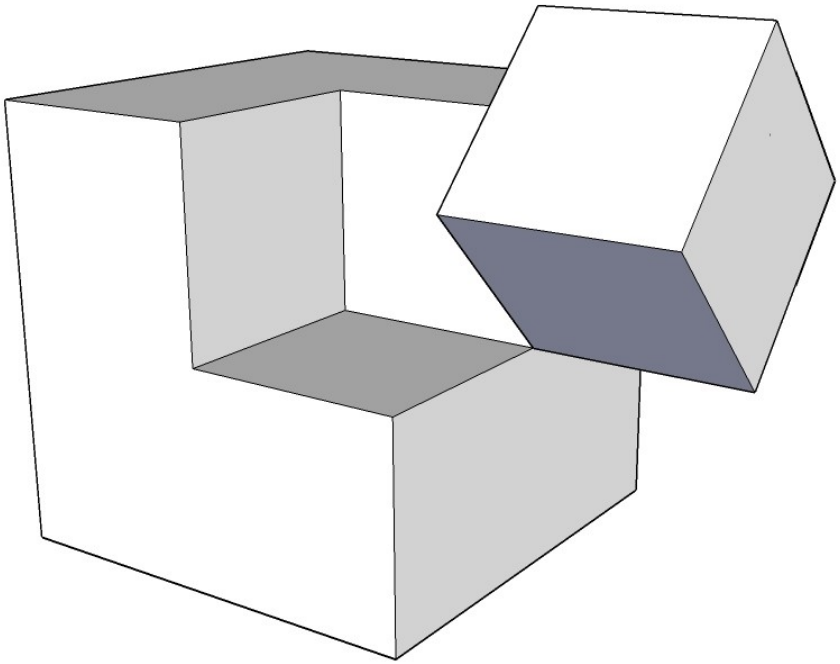
Multiplication,



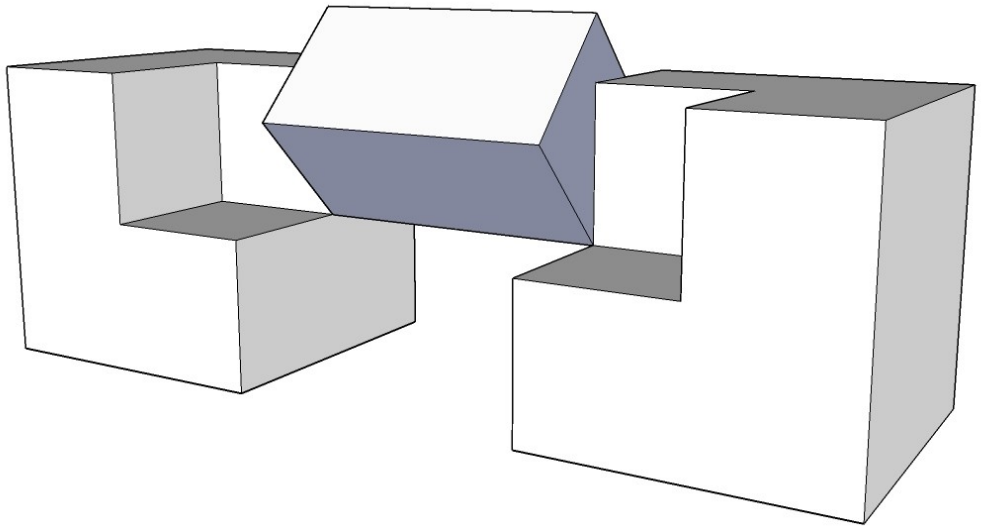
Translations :



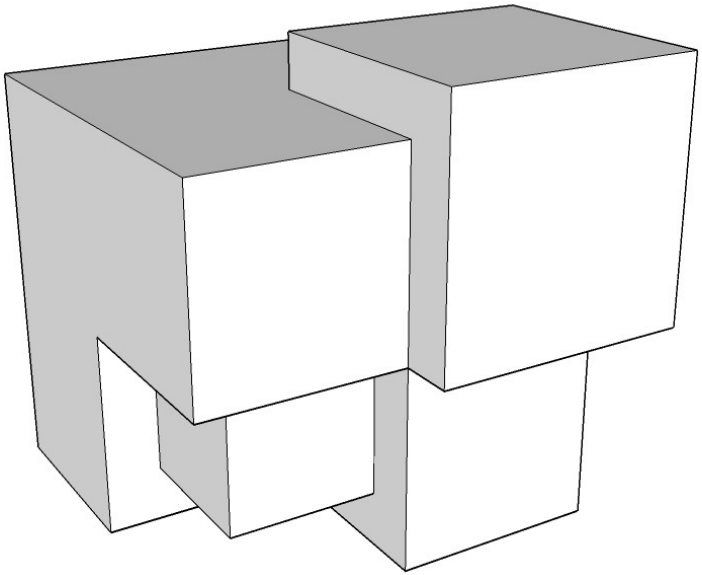
Rotations,



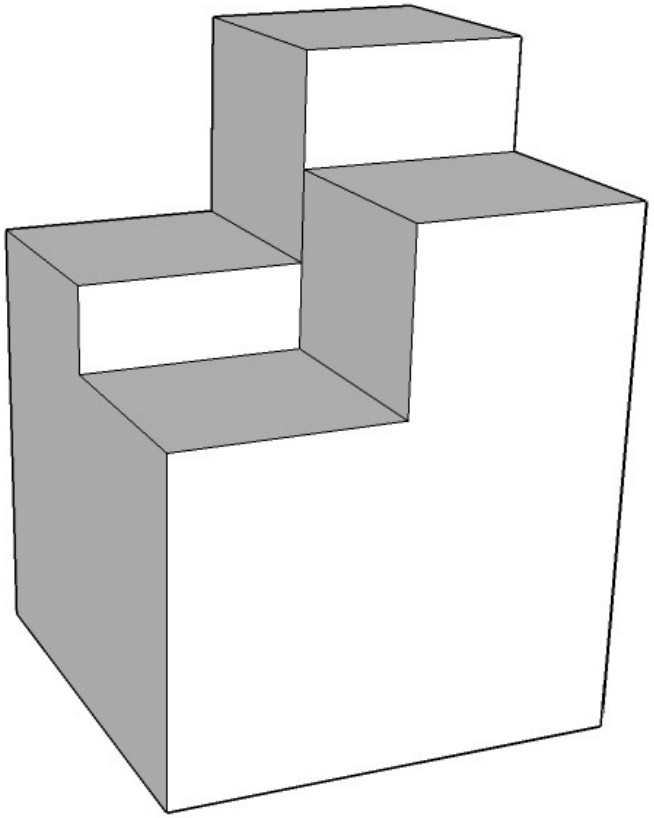
Symétrie :



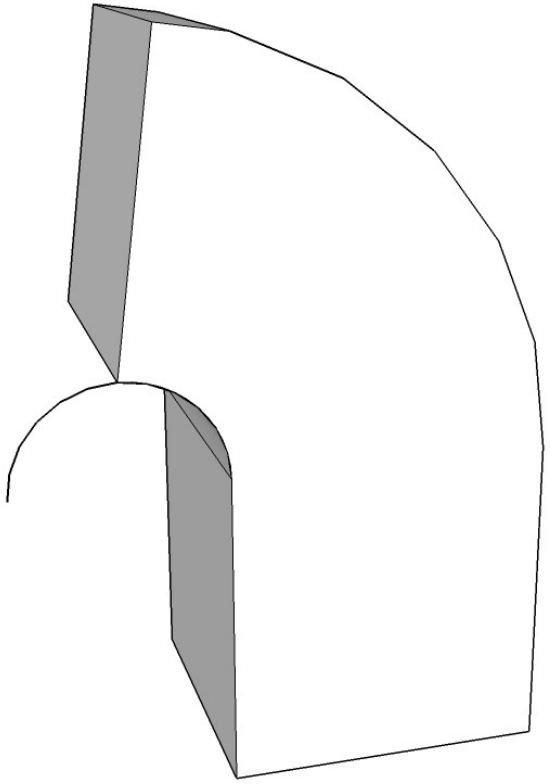
Echelle :



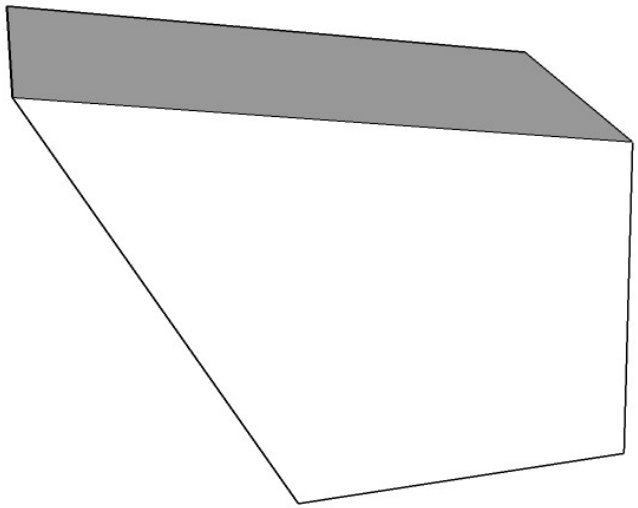
- Extrusion :



- Révolution



- Stretching



- Folding :

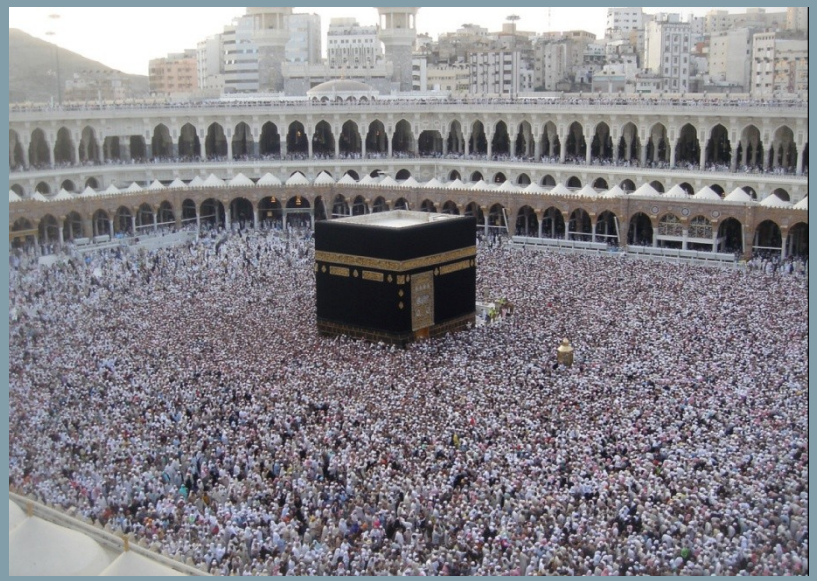
- Swelling

- Torsion

Form and Space

Introduction Islamic Architecture

- A spirit of abstraction, rejection of idolatry
- A Unity in the liver and of God
- Diversity in cultures



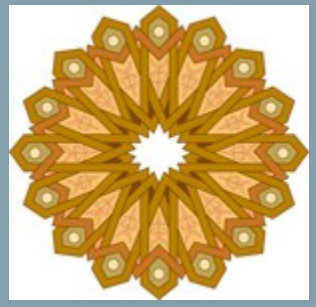
Features

Arabesques

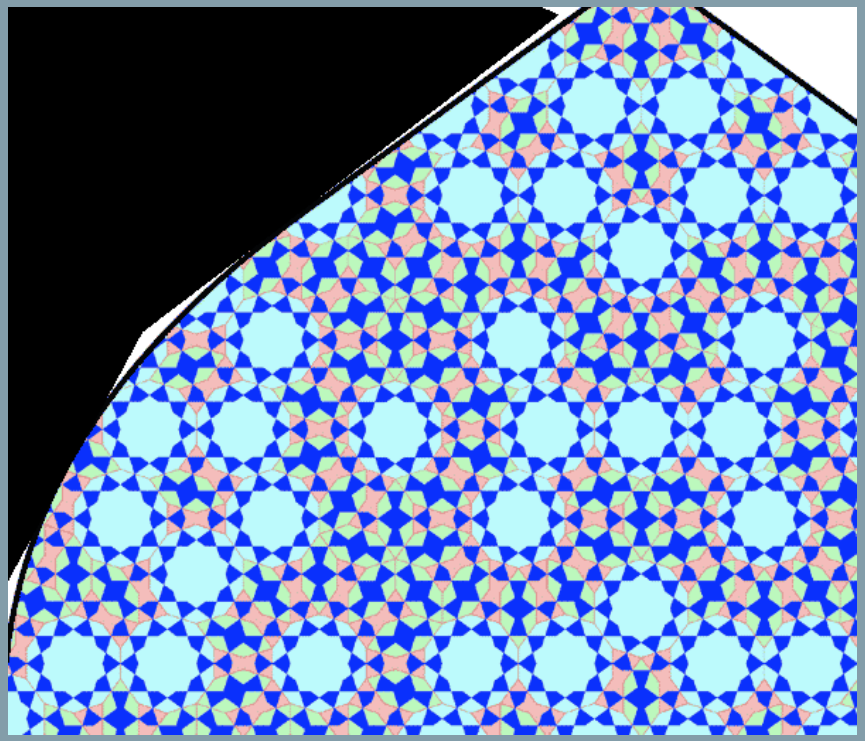
Geometry

- Distinctive decorative patterns arranged repetitively in pure geometric configurations

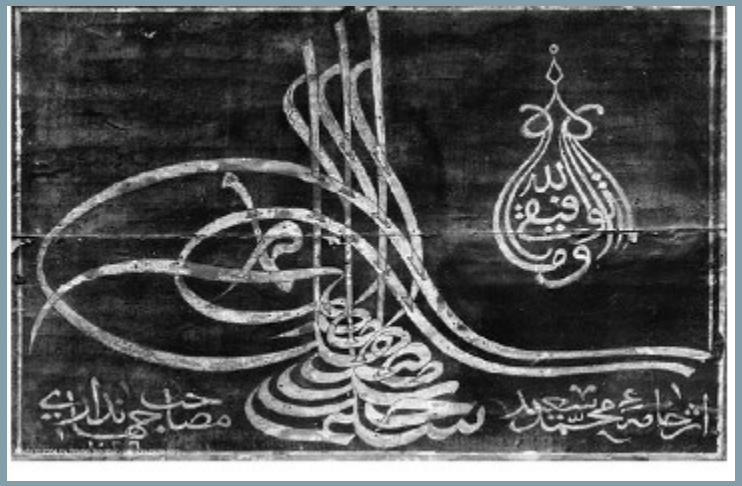
A Beauty of Symmetry



Pleasant Rehearsal




www.GreatBuildings.com



A Mathematical Background symbol of an organized world

Accenting Spirituality

The shape as a container of space

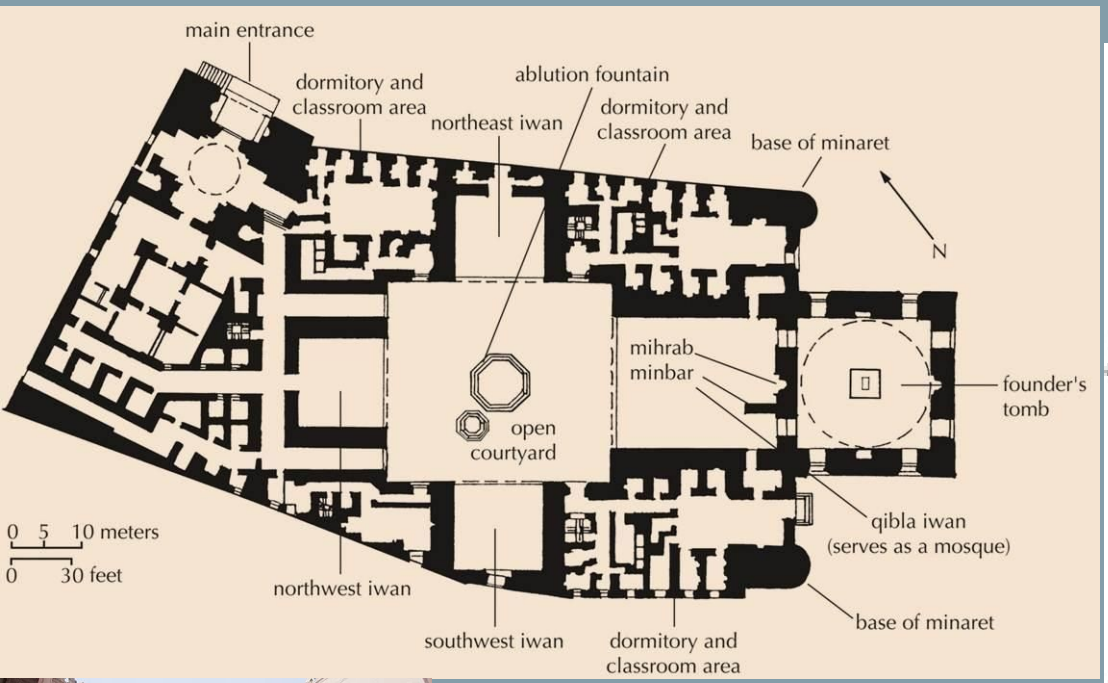
Architecture richness appears from the patio :

Forming interior elevations

The introversion as principle

Architecture richness appears from the patio

Forming interior elevations

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An Art/Architecture in Symbiosis with the Environment

Al Hamra Palace Granada

- Symbol of a culture of faith and know-how