

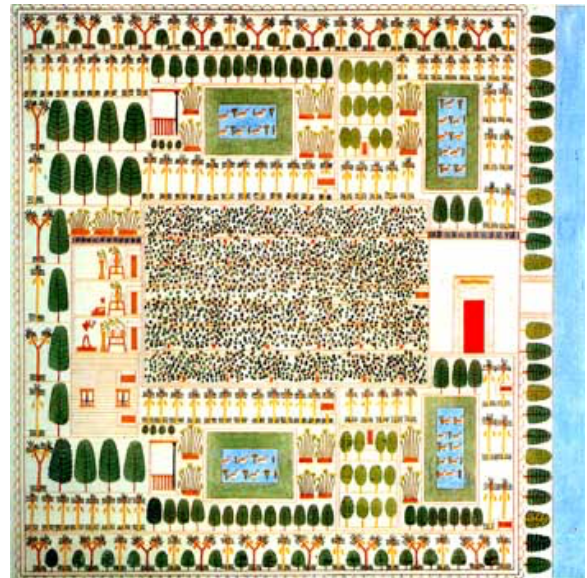
## THE SYMMETRIES OF GARDENS

Ben Satzman  
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The world's first gardens originated in prehistoric times with the emergence of forest gardening, a plant-based food production system. However, the enclosure of outdoor space that began in West Asia in 10,000 BC prompted the first garden construction that incorporated basic aesthetic and design principles. Egyptian tomb paintings from the 16<sup>th</sup> century BC present some of the earliest evidence of carefully manicured gardens that used symmetry. They show lotus ponds surrounded by symmetrical rows of different plants.



*Ancient Egyptian tomb paintings of symmetrical gardens*



*Ancient Egyptian tomb paintings of symmetrical gardens*

Ancient Persian gardens developed later, but also incorporated design ideas that were similar to that of ancient Egypt and Asia. This is exemplified with their repeated use of designs along a central axis of symmetry and simple mirror symmetry that can be seen from aerial photographs. One of the most famous examples of an ancient symmetrical garden that can be seen today is the Sigiriya water garden in Sri Lanka. Although not as symmetrical now, the Sigiriya water garden, built on a strict east-west axis, once had perfect mirror symmetry and functional purposes as well. Different tiers of the garden served as flood plain reservoirs and water irrigation, and the symmetry helped establish these functional aspects. Geometric symmetries were common characteristics of landscape and garden design in Asian cities and reflect Confucian and Taoist ideals as well.



*Aerial picture of Sri Lanka water garden in Sigiriya*

The development of formal gardens from the Late Middle Ages changed the ways gardens would look forever. A formal garden is a garden with a well-defined structure, basic geometric shapes and a symmetrical layout. They often have low box hedges or flower borders and use extravagant characteristics because they are usually made by wealthy people. The popularization of formal gardens reached many European countries, including France, Italy, England and much of the United Kingdom. The axial and symmetrical arrangements of pathways and beds were supposed to establish a sense of order and transparency. Most of them usually have multiple mirror planes and occasionally include rotational symmetry.



*Sample layout for a formal garden*

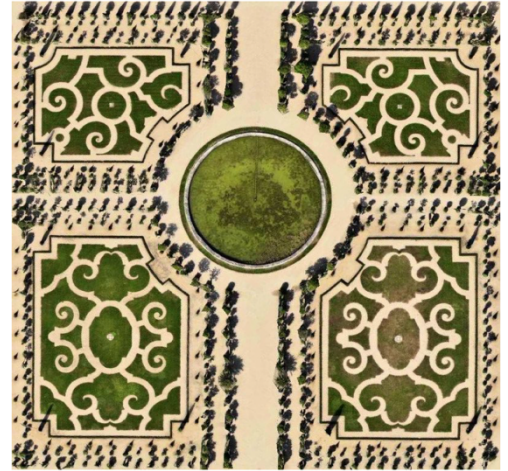


*A formal garden with  $D_8$  and rotational symmetry*

There are many examples of formal gardens, but some are nicer than others. Some of the most famous gardens include: Het Loo Palace, Apeldoorn, Netherlands; Orangery, Garden of Versailles, France; Hampton Court Palace, Molesey, UK; Vatican Garden, Italy. These examples have apparent similarities in their forms and relationships between space and color.



*Het Loo Palace, Apeldoorn, Netherlands Garden (1686)*



*Orangerie, Garden of Versailles, France (1682)*



*Vatican Garden, Italy (1279)*



*Hampton Court Palace, Molesey, UK (1514)*

Most formal gardens put down light colored dirt or sand in order to create a distinct contrast between the ground and the hedges. The geometry and symmetry of the gardens can clearly be seen from aerial perspectives, but offer a different perspective when you are walking through. Most of these examples also incorporate fountain or round shapes in the center, which draw attention to the paths and give the gardens an incredibly large sense of space. At the end of these gardens, there are massive, meaningful and palatial buildings and the constructions of the gardens allow the buildings to be seen quite clearly, hinting at their importance.



*Vatican Garden, Italy (1279)*

Modern symmetrical gardens are a relatively new chapter in the history of gardens. They have less rounded shapes and utilize flatter designs. This means there are mainly rectangle shapes and lower to the ground grasses instead of hedges. However, some of the same qualities remain, including basic mirror symmetries and leading axes.



*Modern symmetrical garden design*



*Modern symmetrical garden design with a half turn symmetry*

Symmetrical gardens are not simply about beauty. They speak to the cultures in which they originated from and provide a historical analysis of how gardens were influenced around the world. The aesthetics and standards for beauty have evolved dramatically over the course of thousands of years, but symmetry still remains. From the ancient Egyptian tomb gardens drawings to the modern gardens in the backyards of expensive homes, symmetry has remained constant and present.