The background of the book cover is a photograph of a landscape. In the foreground, there is a field of tall, golden-brown grasses. In the middle ground, there is a dense line of trees. In the background, there are rolling hills or mountains under a hazy, golden sky. The overall color palette is warm and muted, with shades of brown, tan, and gold.

Roger Burrows

Geometry Through Time

Labyrinths

A look at the cultural development of geometry from
Neolithic times to the present day.

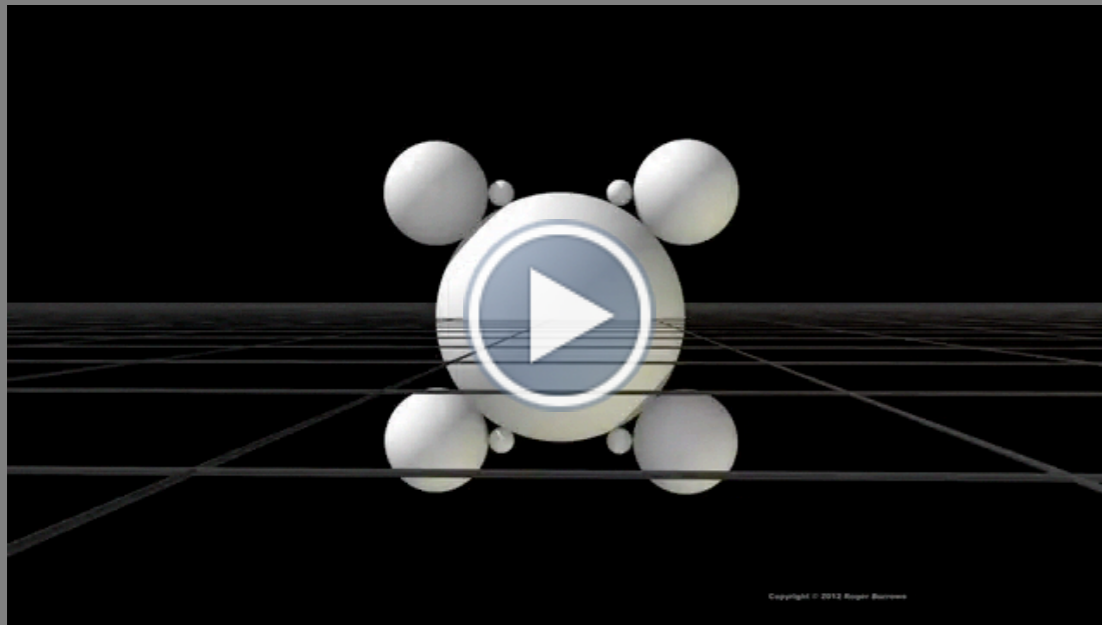
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Introduction

Photo of Saturn and Titan Copyright NASA

Movie 1.0 Geometry of Spheres



Short movie clip from the "Geometry Through Time" title. "The Future."

Geometry Through Time is an exploration of cultural geometry and of new geometrical abstractions that will hopefully stimulate new ways of thinking about geometrical design. The theme will be developed into a series of books that will look at many geometrical systems and their applications in Neolithic times all the way to the present, and stopping off, if you like, in ancient Greece, Rome, Arabia, China, Southern Asia, the Americas, and Europe; and only stopping in places, and times, where there is something new to say and some new insight to share.

This first book in the series explores **Labyrinths**: a subject that is easy to start with, and such that it allows the author to build his skills with **iBook Author** and with animating in Lightwave 3D, After Effects, and Flash! As the labyrinth geometry is relatively simple this book will be shorter than subsequent titles. Other titles in the series will be as follows: **The Pythagoreans**; **Art of the Arabs**; **Gothic Style**; **The Nomads**; **Art of China**; **Art of India**; **The Celts**; **The Americas**; **Images**; **The Future**.

"**Images**" will look at how the Images Design Books, published by Running Press in the USA, and the Altair Design Books, coauthored with Dr. Ensor Holiday, published in the UK by Wooden Books, conjure images and stimulate the visual imagination. "**The Future**," will include the geometries of spheres and transforming structures developed by the author, as well as new lightweight structures, portable architectures and possible non-terrestrial structures that might be erected in low gravity environments.

Neolithic to Gothic Labyrinths

We have to start with the premise that designers who lived three or four thousand years ago were just as intelligent as we are today. The only difference is that we have access to a wealth of accumulated knowledge and experiences as well as the use of technologies that have developed over the millennia. The inference, then, is that ancient architects approached challenges with as much thought and innovation as we do today.

Geometry Through Time analyzes the cultural applications of geometry through time. The geometrical design systems used, the way the systems were used, and the mind sets as far as they can be determined or guessed at. This first book in the series starts with something relatively simple, the Labyrinth.

Neolithic to Gothic Labyrinths

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A labyrinth carved in granite in Armenteira, Galicia, Spain. Possibly late Neolithic, or Bronze Age, about 2000BC. Copyright Creative Commons



The form you see on the left is called a labyrinth. Enter in at the upper left and find your way into the center. The typical labyrinth has a single path that winds towards a center point in a meandering sort of way. The path winds inwards and outwards, a few times, before it leads to the

A LABYRINTH IS NOT A MAZE

1. The oldest surviving labyrinths, that we know of, are carved on stone.
2. Legends describe labyrinths that are above and below ground.
3. A labyrinth is different to a maze in that there is only one path through to the center or end.
4. Today people walk labyrinths. Stories tell us that in the time of Theseus a Minotaur inhabited the Cretan labyrinth.
5. Neolithic labyrinths were most likely used as part of winter solstice rituals.

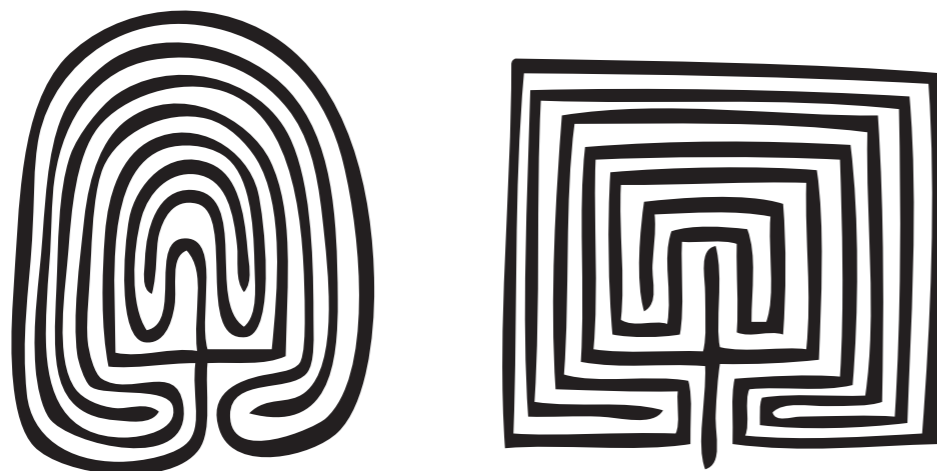
center. The oldest surviving labyrinths appear in Neolithic or Bronze Age rock carvings and the most common design is called the, "Classical Labyrinth," and appears repeatedly, through time and space, and now appears in stately homes and theme parks. Probably the most famous application of the Neolithic labyrinth occurred about two thousand five hundred years ago in ancient Crete and is associated with



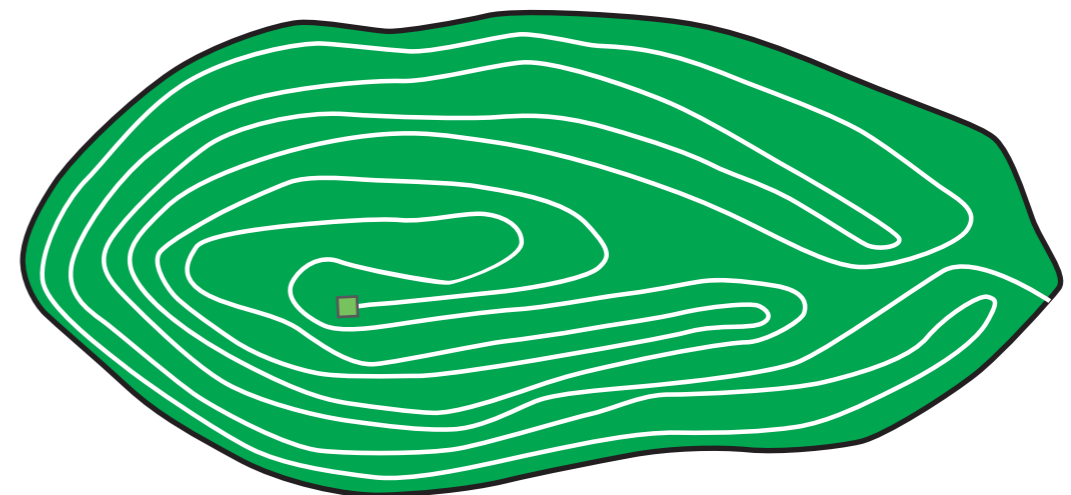
legend of the Minotaur. A version of the Cretan labyrinth can be seen on a coin from Knossos, see page 3.

At some time the “Classical Labyrinth” arrived into the Hopi culture. The Hopi labyrinth is often referred to as the, “Mother and Child,” labyrinth and was most likely introduced into that culture after the arrival of the Europeans in the Fifteenth Century. How and why it was introduced, and then copied in the Americas, must be a story unto itself. Possibly the labyrinth design struck a chord with the local cultures due to their usage of spiral designs. If not introduced by the Europeans then one conjecture is that the usage might be evidence of the arrival of the Norsemen in the Tenth Century. There are a few labyrinths in Norway dating from about 1000 AD. Before that the introduction could conceivably date back to the traffic of peoples across the Bering Straits or costal sailors arriving from the West 15,000 years ago or earlier.

Two variations of the Hopi, “Mother and Child” labyrinth.



Another variation of the Classical Labyrinth appears to wind around the Glastonbury Tor, in England; a strange sort of hill, once an island surrounded by marshes, and wrapped in legends of King Arthur and the Holy Grail. There is no certainty that the formations, that wrap around the Tor, are indeed those of a Classical Labyrinth. It's possible that the schematic below shows the path as it was, so see if you can recognize the labyrinth in it.



As a maze, the “Classical Labyrinth” is way too easy to solve. You cannot help but find your way in or out! As a labyrinth you get close to the center three times before arriving there. You rotate about the center four times clockwise and three times anti-clockwise. Same is true for the Glastonbury Tor, if that is indeed a full, “Classical Labyrinth.” So why would you walk into, or along the paths of, a labyrinth? We only have legends and folklore as sources of knowledge. My guess is that the labyrinth served as a sacred path rather than as a maze. As a maze it’s just about useless and, if I was King Minos, of ancient Crete, I’d ask Daedalus, who supposedly selected the labyrinth design to trap the Minotaur, for my money back. On the other hand it is possible that the legendary Minotaur was trapped in an underground maze of branching paths rather than in a labyrinth. It is also possible that the legend of the Minotaur in the labyrinth spun out of an earlier fertility ritual. To use a labyrinth as a tomb, or to house some treasure, doesn’t seem to be logical. It is only if the path to reach the center is as important, or more important, than that which is at the center of the labyrinth, that the idea of the labyrinth makes any sense. So what do we do when we walk the labyrinth? Do we simply get disoriented, or do we contemplate some idea as we rotate and turn and, if so, what idea? I think the solutions come down to the cultures within which the labyrinths are used. In Neolithic communities the cycles of the sun, moon and seasons were of great interest and of great importance to survival. The Mother Earth Goddess, and the spirits of nature, formed the basis of many religions of that time. The religious

nucleus of Cretan mythology was also the worship of the Sun, the Moon and the Stars, but there was also a preoccupation with multiple gods and with the underworld. So, was there a ritual where one travelled into the four corners of the Earth, represented by the four inner corners of the labyrinth, to pray for a good harvest? Or was a labyrinth a training ground for going to meet Hades after death? All idle speculations but interesting conjectures.

Movie 1.1 Walking along the Classical Labyrinth



Walking the path of the “Classical Labyrinth.”

Labyrinths can be found all over the world and from different eras. One type appears in a carving in the 12th Century Hoysaleswara temple, Halebidu, India, and shows the warrior Abhimanyu entering the Chakravyuha. The Chakravyuha was considered to be an impenetrable fortification but Abhimanyu found a way in, saying that he learned the technique when still inside his mother's womb. Unfortunately he did not have the technique to exit the Chakravyuha and was killed on the way out. The legend dates back to 400 BC or earlier. The Chakravyuha, as a labyrinth shares some of the features of the Classical Labyrinth but, if the Hoysaleswara temple carving is correct, it was much simpler, with only five layers including the center.



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In 1969, when first analyzing labyrinths, I noticed that many labyrinths appeared to have been constructed around a central core, or "Key." In the case of the Classical Labyrinth it is a central cross surrounded by four cups each containing four dots. The "Key" to the Hoysaleswara Labyrinth is simpler. For Key development see Chapter 2.



One of the Hopi labyrinths and the Classical Labyrinth appear to use Key 10, see below. The other Hopi Key is Key 11.

