

Committee 1
Symmetry in Its Various Aspects:
Search for Order in the Universe

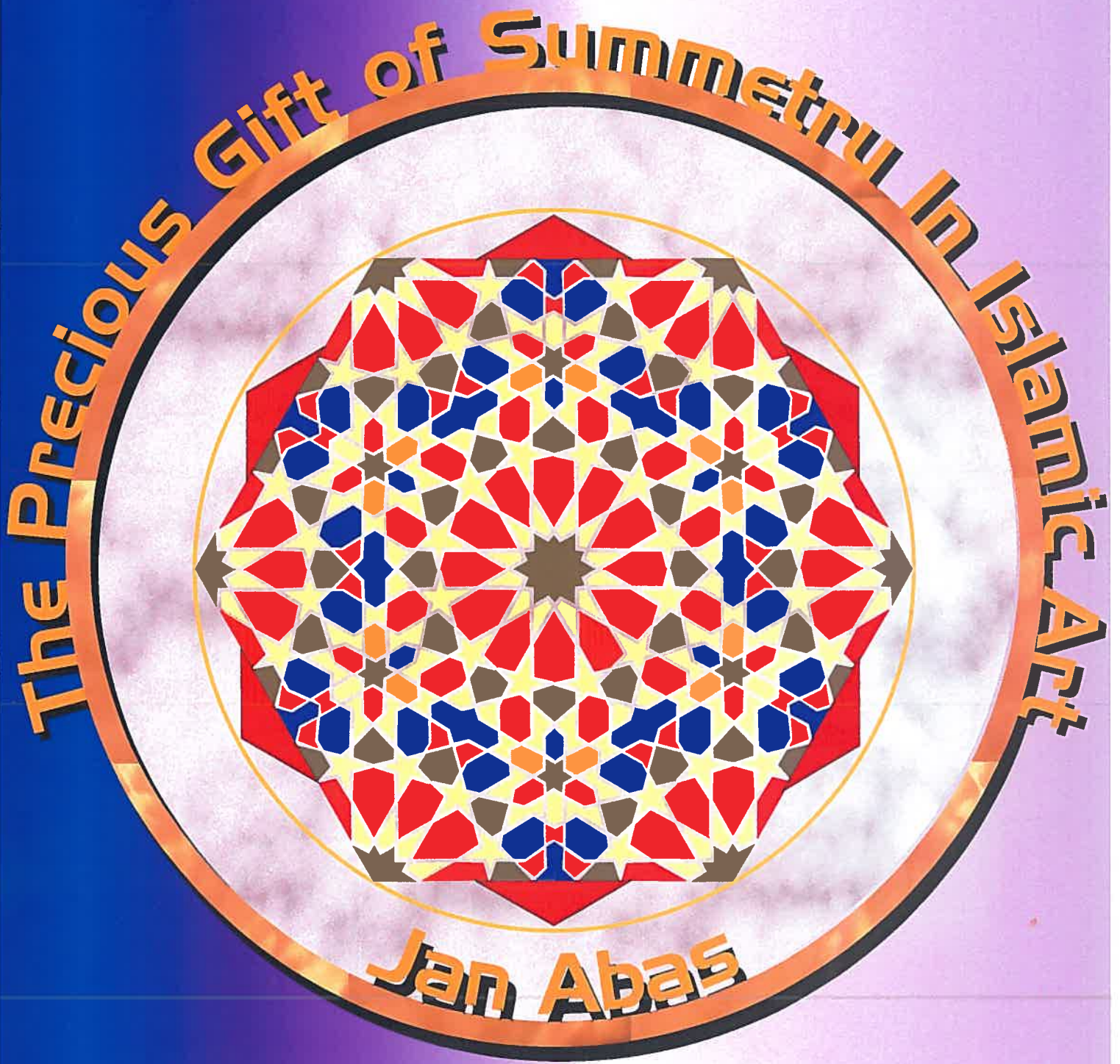
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The Precious Gift of Symmetry in Islamic Art

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**University of Wales
Bangor**

Overview

Introduce Symmetry and Islamic Art

**Point out the key characteristics
of Islamic Patterns**

**Dispel the major misconception
regarding the driving psychology**

Review the meaning and range of Symmetry

Comment on the significance of Islamic art

Show some examples of my Art

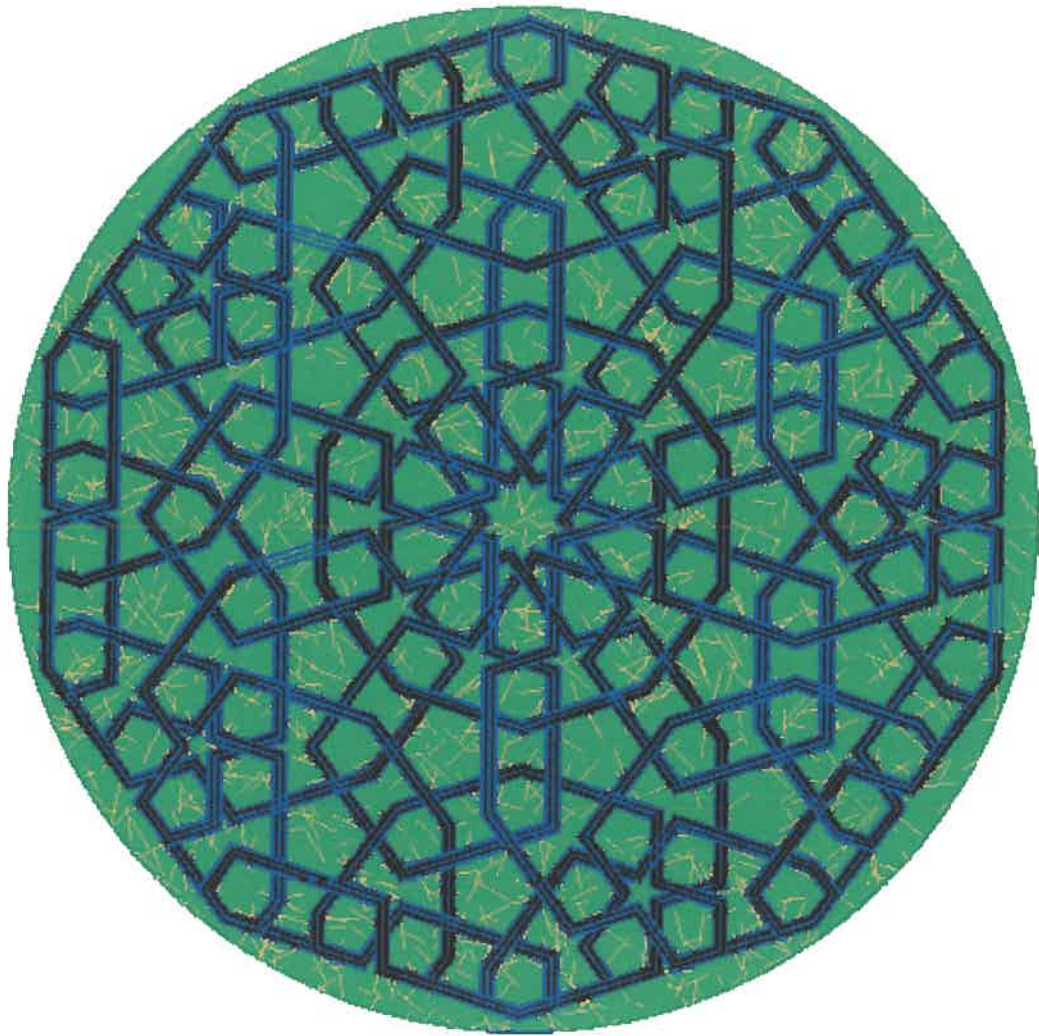
1. HISTORICAL FACT

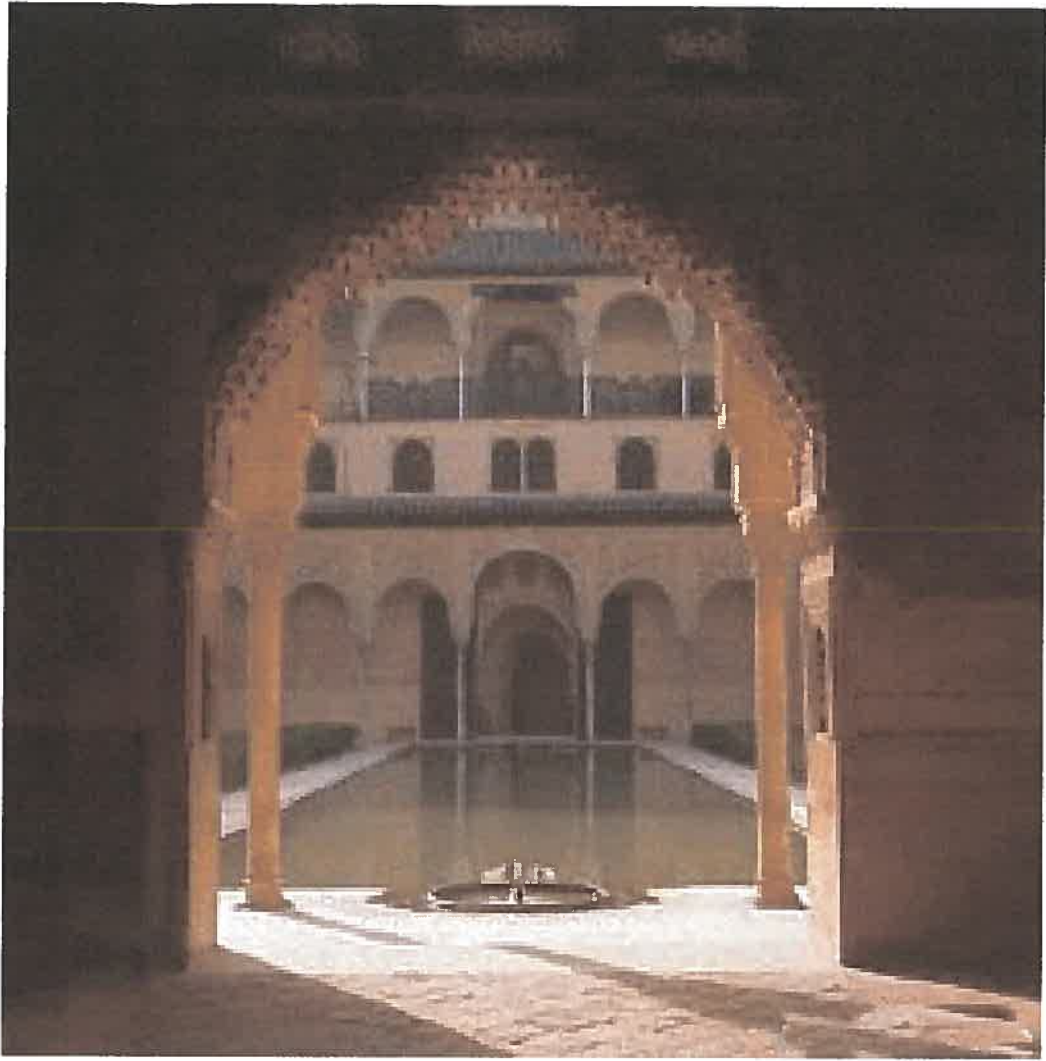
**SYMMETRY FIRST
EXTENSIVELY EXPLORED
IN ISLAMIC
CIVILIZATION**

**Pattern
Calligraphy**

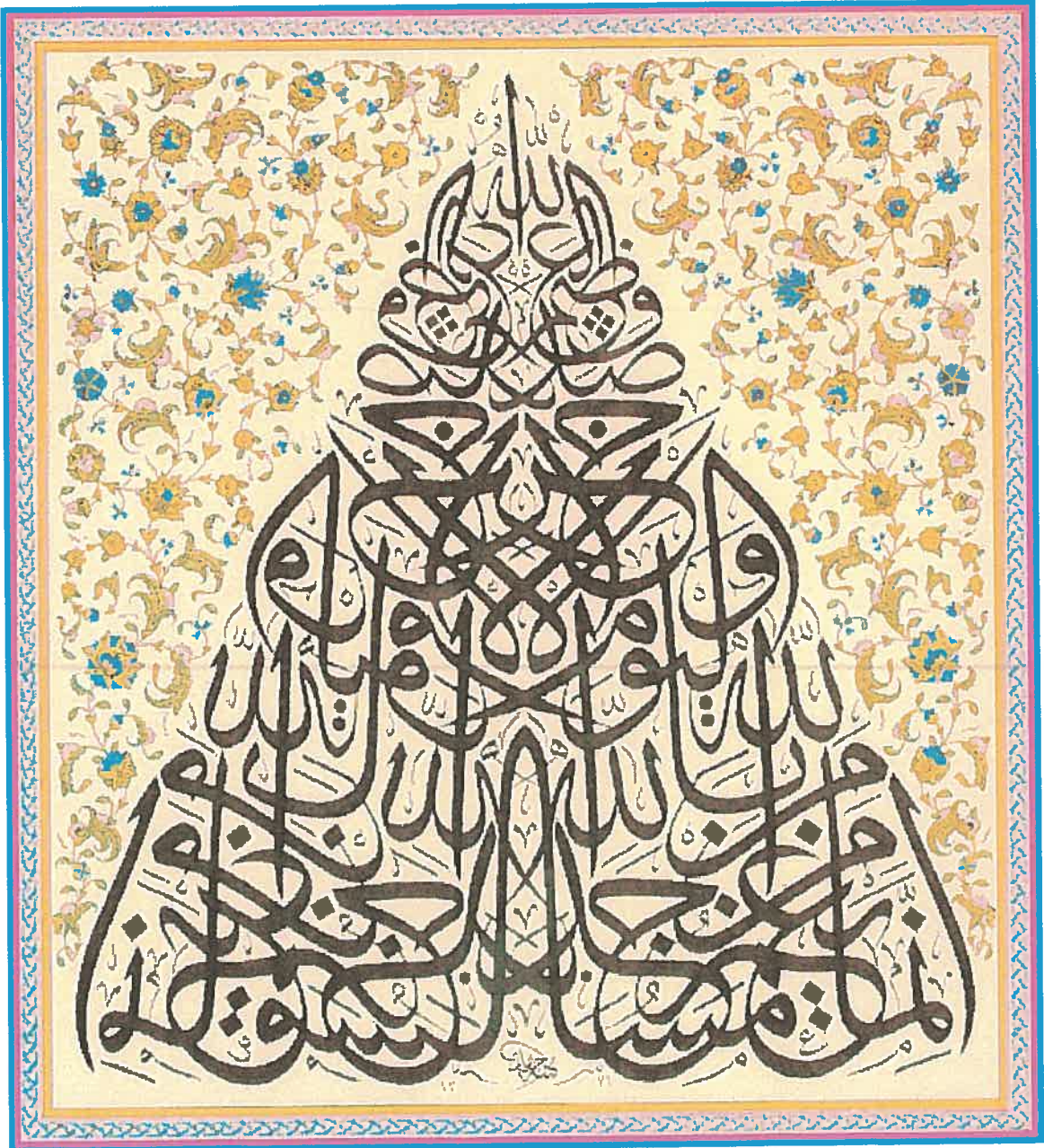
**Finest monuments to
symmetry:**

**Taj Mahal East:
Alhambra West**





بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ



EXAMPLES OF ISLAMIC PATTERNS [SLIDE: 10]

CHARACTERISTICS

Variety of shapes, but the vast bulk have the following features:

Stars & Constellations

5, 6, 7, 8 pointed stars

8, 9, 10, 12, 15,

16, 18, 20, 24... 48 (multiples of 3, 4, 5) constellations

Lines turn at sharp angles (unlike Celtic art, curves are rare, except in arabesque)

Interlacing

**COMMON
MISUNDERSTANDING
AND EXTRAORDINARY
FANTASIES
REGARDING
PSYCHOLOGY**

Escher [SLIDE]

Critchlow [SLIDE]

**Examples of figurative art
[SLIDE: 4]**

POSITIVE REASONS FOR ISLAMIC PATTERNS

No Image of God in Islam

God is the light of heavens and earth

God did not become flesh

God Spoke (in Arabic)

Muslim Intellectuals found spirituality in Geometry

[SLIDE]

Astronomy & Astrology were major passions of desert dwellers

There was a large amount of experience of carpet weaving

Islamic Geometric Art is:

A Celebration of Stars

(which give light)

A Celebration of Holy

Words and Arabic Language

**(which produce God-
consciousness)**

A Celebration of Geometry

(which points to a perfect

underlying

reality)

A reflection of the experience

of tent-dwelling and carpet

weaving (interlacing)

WHAT IS SYMMETRY ?

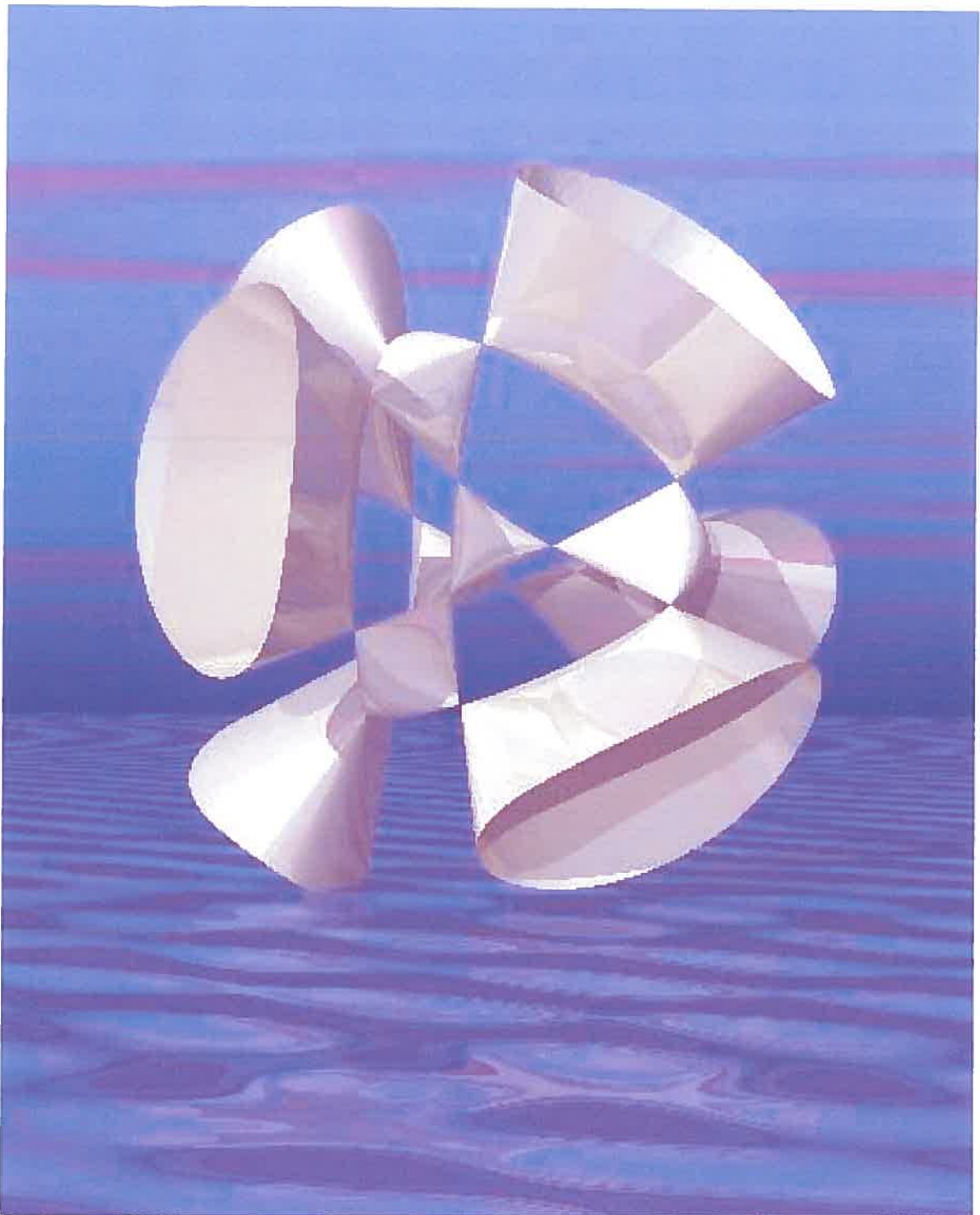
SHAPE-BASED DEFINITION

Regular arrangement of parts of an object around a line or a plane (bilateral), around an axis (radial), around a point (spherical)

ACTION -BASED DEFINITION

The grand unifying power of symmetry comes when we define it not in terms of shapes but:
ACTIONS WHICH LEAVE THINGS UNCHANGED

A system is symmetric if there exist a set of actions (transformations) which leave some property of the system unchanged (invariant).



The 3 features of Symmetry
Shape, Action, Invariance

Kumer Surface

the quartic algebraic surface
 $x^4 + y^4 + z^4 - y^2z^2 - z^2x^2 - x^2y^2 - x^2 - y^2 - z^2 - 1 = 0$

It has lots of symmetries.

Some Examples Of Symmetry

To every action there is an equal and opposite reaction.

A changing electric field gives rise to a magnetic field.

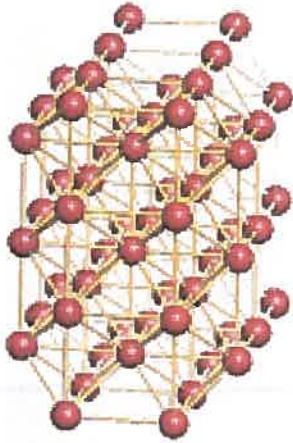
Do unto others as you would have them do unto you.

Every elementary particle of mass m and charge e has a twin of charge m and mass $-e$.

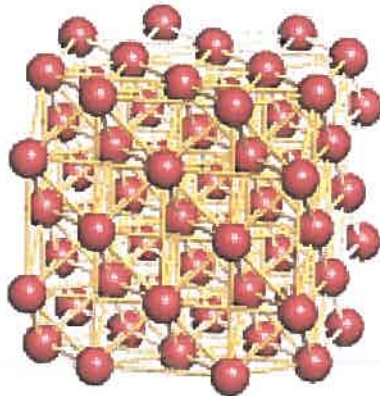
The speed of light is independent of the motion of the observer.

The Laws of Nature are Invariant in the Universe

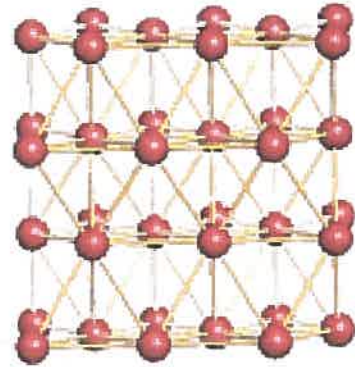
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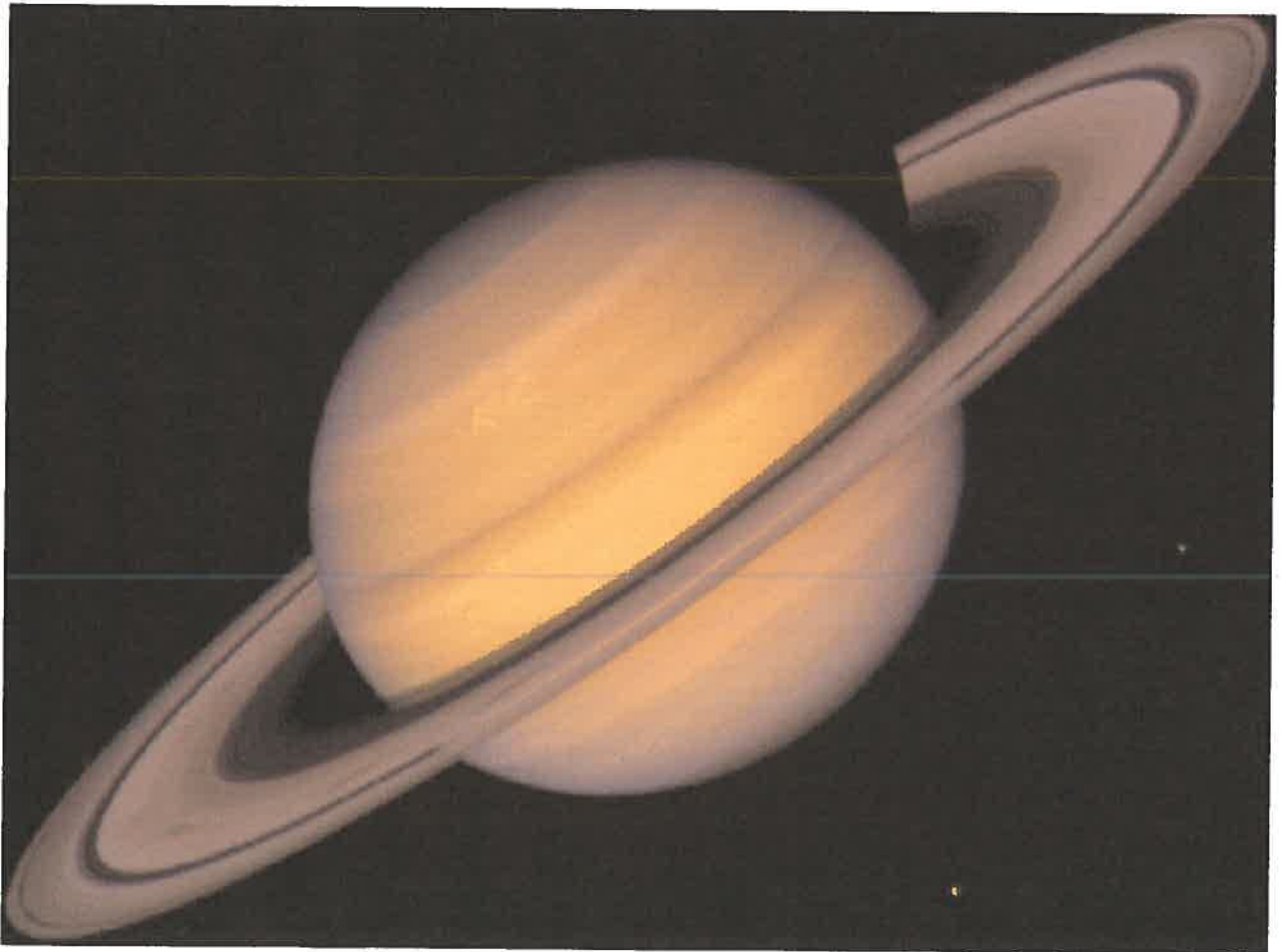
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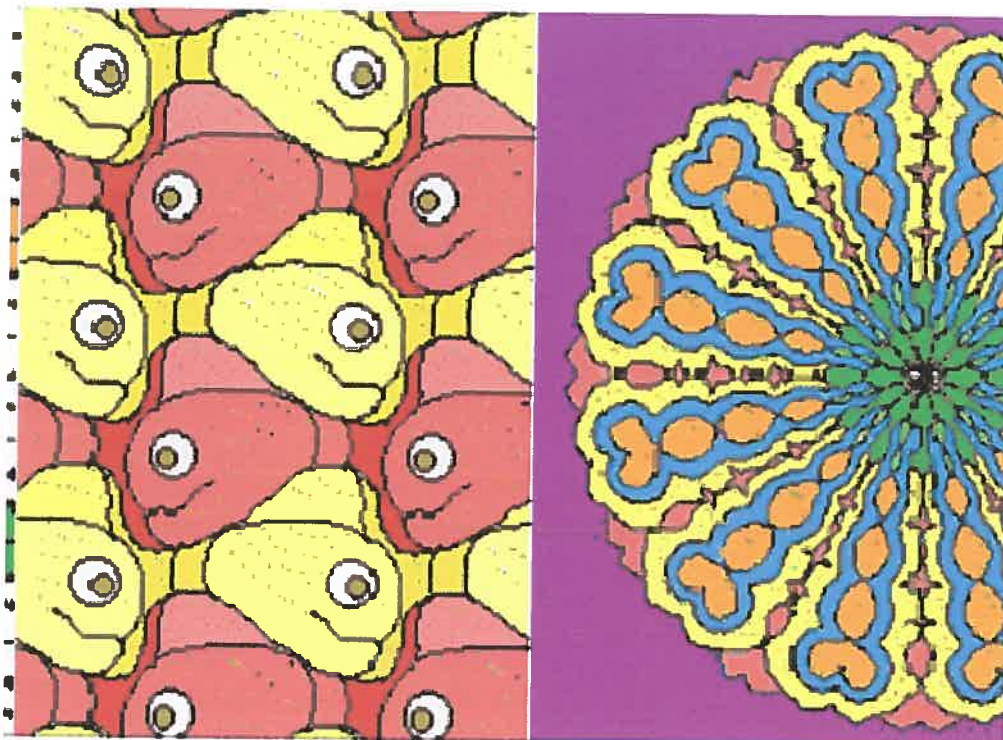
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crystal structures of iron



Planet Saturn



Kindergarten



Temari

Symmetry offers pleasure



Symmetry is exploited in display
for attracting a mate



Symmetry is exploited in display
for attracting a mate



Diamond cut bi-color Topaz

Symmetric crystals (diamonds) are offered
to seal male-female union
to express life-long commitment and bonding

"Diamonds are a girl's best friend"

"Diamonds are forever"

**THE BRAIN
(HUMAN & ANIMAL)
IS TUNED TO RESPOND
TO SYMMETRY**

**Dr. Anders Pape Moller
(Copenhagen University)**

**Swallows with unevenly
trimmed tails (zebras with
uneven stripes) cannot find
mates**

**Bumblebees shun flowers
with asymmetric petals**

**Dr. Randy Thornhill
(University of New Mexico)**

**People with the most
symmetrical faces are judged
the most attractive.**



OTHER FINDINGS

**Symmetrical racehorses run faster.
Symmetrical scorpions live longer.**

IMPLICATIONS

Symmetry is a sign of genetic fitness. It is the most symmetrical of plants, insects, flowers and animals (and humans) who come out on top in the natural world. It plays a key role in natural selection. THEY ARE BETTER ADAPTED TO ABIDE.

SYMMETRY IS USED TO
EXPRESS
SENSE OF ORDER, HARMONY,
VIRTUE
GRANDEUR , ETERNITY

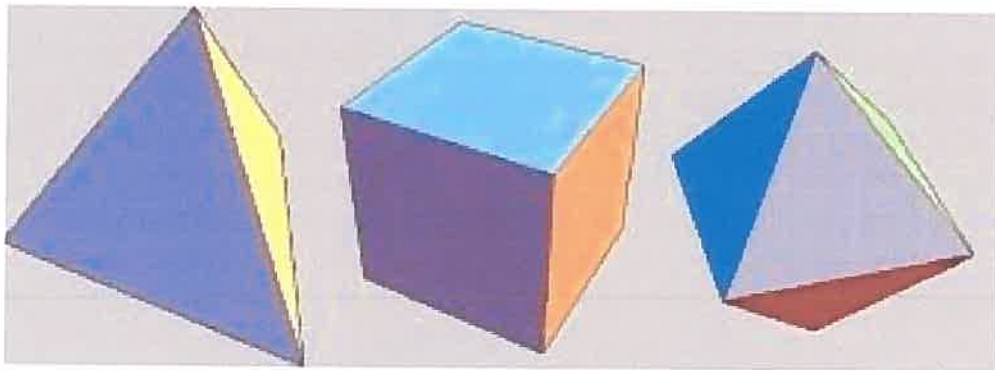


A Druid Ceremony at Henge
Brittany, France
(19th century painting)

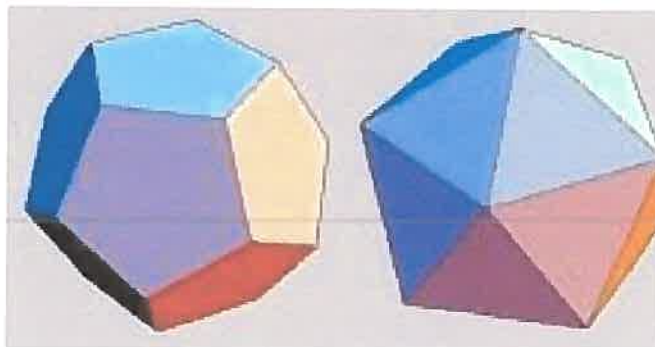


Great Pyramid of Cheops

Fire Earth Air



Water



Platonic Solids
(explored at least a 1000 years
before Plato)

WHEN DEFINED IN TERMS OF ACTION-INVARIANCE

**Symmetry is seen to be at the
root of science**

**Every major scientific advance
occurs through the discovery
of some symmetry (mass,
momentum, energy, charge,
speed of light)**

**Symmetry is also seen at the
root of civilized moral
behavior.**

**THE GOLDEN RULE: THE
UNIVERSAL MORAL PRINCIPLE**

**"What you do not want done to yourself,
do not do to others."**

-- Confucius (6th B.C.)

**"Do not do to others all that which is not
well for oneself."**

-- Zoroastrianism (5th B.C.)

**"May I do to others as I would that they
should do to me."**

-- Plato (4th B.C.)

**"Do nothing to others which you do not
want done to yourself"**

-- Hinduism (3rd B.C.)

**"Whatsoever you would that men should
do to you, do you even so to them."**

-- Jesus of Nazareth (1st A.D.)

**"Treat others as you would be treated
yourself."**

-- Sikhism (16th A.D.)

**SYMMETRY IN ITS MOST
GENERAL FORM
HAS TO DO WITH THE
QUESTION
WHAT ABIDES?
AND
THAT IS THE KEY
QUESTION
NOT ONLY FOR THE
SCIENTIST
BUT ALSO FOR
THEOLOGIAN
AND EVEN THE MOST
HUMBLE INSECT**

GOD IS THE ULTIMATELY SYMMETRIC

**The poet Ibn Zamarak whose verses grace
the walls of Alhambra wrote:**

**Between the sun's rising and setting
Myriad love songs were sung.
And those who were mortal departed,
And He who is Eternal lives on.**

**How beautiful! How true!
And what does it say?
It says that in time everything changes
except God. Thus God is symmetric
and the every process in the evolving
Universe is one of its symmetries.**

**Symmetry deserves to be the subject of
periodic festivals so that in its lofty
atmosphere one can search for the
relation between different manifestations of
the human spirit.**

K.S.Mamedov (Russian Physicist)