

**In this presentation, the word god is meant as an ideal principle of the world, and where appropriate, as the cause of nature.**

**All thoughts and beliefs expressed in this presentation are meant to illustrate a point. They are NOT meant to influence or criticize your own beliefs.**



# **Science and Belief**

The relationship between  
nature and scientists' beliefs



## Many years ago...

- No human knows.  $\Rightarrow$  Only God knows.
- Then, people start learning about nature.
- Eventually, can everybody know about everything...?

In other words,

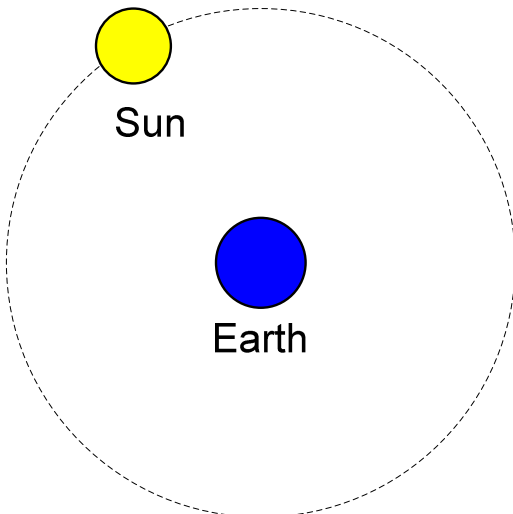
Can we learn about this whole nature with science?



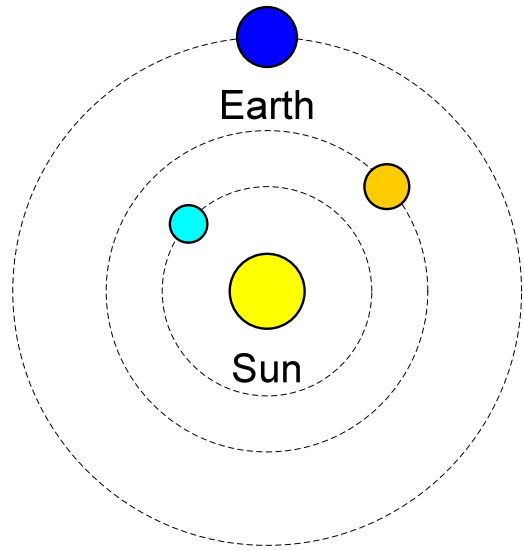
## Part I:

### How Scientists Have Interacted with Nature

- The scientists had to think about both nature and god since the nature belonged to god.
- (1543) Nicholas Copernicus proposed the heliocentric theory instead of Ptolemaic (geocentric).



Ptolemaic Theory



Heliocentric Model

# Nicholas Copernicus (1543)

- From Ptolemaic (geocentric) to Heliocentric models (taken over by Galileo Galilei)
  - From an ideal world to the actual one




**Copernicus**

**Why do you say  
such a stupid thing?**



**Martin Luther**



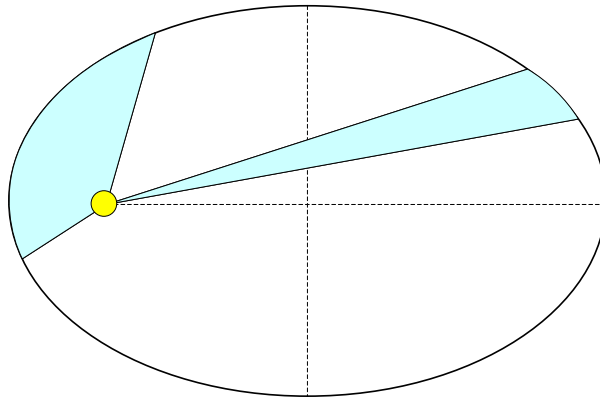
Even though Copernicus' beliefs were in conflict with the beliefs of the time, he defended them by saying that the circular orbit of the Earth was still in accordance with god's will...

The orbit of the earth is circular.

# Johannes Kepler



- He proved that the orbits are elliptical.




However, he didn't mean to disprove the theory of circular orbits.





## The scientific world without god!?

- The result was that the scientists had to remove the “idealism” from the world.
- The *god's will* anticipated by humans didn't seem to lead to an understanding of the world.

- 
- Copernicus  $\Rightarrow$  Simplicity of nature (The change of concepts)
  - Galilei  $\Rightarrow$  Conjecture with experimental results
  - Kepler  $\Rightarrow$  Data and keen insights
  - Descartes  $\Rightarrow$  Mathematical description of the world

**The beginning of a mechanical world**

# Isaac Newton (1642-1727)

- The father of modern physical science
  - The laws of gravity
  - The equation of motion
  - The initiative of the idea of a deterministic world





## ▲ The Implication of Newton's Equation

- If you know all of the initial conditions exactly, you will know the future planetary motion. (position, velocity, etc.)

**However,...**

**He still didn't know the causes of the initial motion.**



Newton said,...

“We still need god to  
explain the cause of the  
initial motion.”



# A More Complete Mathematical World?

**Eighteenth century in France,...**

## Napoleon Bonaparte & Simon Laplace

Napoleon asked him

“You gave me a copy of your great work, the *Mechanique Celeste*, and I found that, in this massive volume about the universe, there is not a single mention of god, its creator.”

Laplace replied

“Sire, I had no need of that hypothesis.”



## Mechanism (Mechanistic Explanation) and the Physical World

- Quite a few scientists and philosophers thought that god's existence was irrefutable.

On the other hand, ...

- The people slowly stopped including god in the scientific analysis.
  - (Separation between religion and science)
- The extremist was Laplace, et. al.

## Was God Totally Separated from Science?

- The notions of god are not unique for some people.
- It depends on the definitions by the people.
- What about the people who think that the deterministic mathematical world is a reflection of god?



Einstein...





# Quantum Mechanics

- The physics for a tiny particle region, such as electrons & photons.

**Here is an imaginary dialogue between Heisenberg and a graduate student...**



**Heisenberg**



**Student**

*Heisenberg:* We cannot know the position and the motion exactly and simultaneously.

*Student:* Does it mean that one cannot determine the future?

*Heisenberg:* Yes, it does.

*Student:* Does it mean that the world gambles?

*Heisenberg:* Possibly.

But Einstein said,...

“God doesn’t play dice.”




**He couldn't believe that the indeterministic physical world is a reflection of the ideal world.**



## **The Ideal Postulates (Programmed by god) in Science**

- Conservation and Creation
- Optimal Principle
- Cause and Effect



## Part II Mystery in Science (Is there such thing as *god's will*?)

There is no satisfactory explanation to the reality...

- Parallel Evolution
- Imaginary Time (Explanation for the Big Bang theory)
- Theory of Everything
- The reality of Quantum Theory



## Mystery continued...

- Why are people here? Why do people think and play?

**The structure of nature seems too perfect for some facts in science.**

**Sometimes they are beyond human knowledge.**

## Part III Some Scientists and their Ideas About Creator

- Until the beginning of the twentieth century, research on cosmology meant research on *god's will*.

**Newton said:** I recognize that God's will exists behind the science theories.



**Einstein said:** The mission of science is to solve God's work.





## Was the Universe created by god?

- Does this entire world come from just coincidences?
- Is this universe merely a mosaic world?



# Anthropic Principle



Robert Dicke

- In 1961, Robert Dicke noted that life is possible in the universe only because of the special relationships among certain physical parameters.

## The Physical Constants


- Gravitational constant:  $G = 6.670 \times 10^{-11} m^3 \cdot kg^{-1} \cdot s^{-2}$
- Speed of light:  $c = 2.99792458 \times 10^8 m/s$
- Gravitational acceleration:  $g = 9.8062 m/s^2$
- Charge of an electron:  $q = 1.60217733 \times 10^{-19} C$

**Plus tons more!!**



## How Significant Are They...

- If the gravitational force were slightly stronger, the stars would burn too rapidly and too unevenly to maintain life-supporting conditions on surrounding planets. If it were slightly weaker, no heavy elements essential for building such planets or life would exist.
- In the case of the speed of light, the slightest change, up or down, would negate any possibility for life in the universe because atoms would not hold together properly.



## Not only those physical constants...

- Distance from Sun

*if farther away:* too cool for a stable water cycle

*if closer:* too warm for a stable water cycle

- Geological activity

*if greater:* destruction of too many life-forms

*if less:* leads to runaway climate instability



## From Anthropic Principle,...

- Is this still part of the coincidence?
- Is this a biased perspective?

Or,...

- Is this world arranged by a creator?

*Or arranged by human being?*

Nobody knows...



# Conclusions

(as open ended)

- The beliefs of scientists influence their understanding of nature.
- Human intuition and idealism toward nature is susceptible to flaws and can be changed by observations and criticism.

The progress of science is made possible by the diversity of backgrounds and the freedom to express our own ideas.