Time
Relativity
and God
The relationship between God and Time

Augustine of Hippo:

- Time exists only within the created universe, so that God exists outside time;
- For God there is no past or future, but only an eternal present;
- Imagine a man walking along a road.
- The man on a road can only see along the road.
- The woman on a mountainside and see all the road.
- She can see the man’s past and the man’s future.
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Are you a Deist or Theist?

Deism:
God (or gods) created the universe but does not alter the original plan for the universe. He knows the past and future of the universe.

Theism:
God (or gods) created the universe and continues to play an active role in it. He exists within time. He does not know the future precisely but has general plans.
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Joshua 10:12-13

Then Joshua spoke to the Lord in the day when the Lord delivered up the Amorites before the children of Israel, and he said in the sight of Israel: “Sun, stand still over Gibeon; And Moon, in the Valley of Aijalon.” So the sun stood still, And the moon stopped, Till the people had revenge Upon their enemies.

- The Christian and Jewish God is prepared to suspend the laws of physics, if necessary.
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So the people of Nineveh believed God, proclaimed a fast, and put on sackcloth, from the greatest to the least of them. Then word came to the king of Nineveh; and he arose from his throne and laid aside his robe, covered himself with sackcloth and sat in ashes. And he caused it to be proclaimed and published throughout Nineveh by the decree of the king and his nobles, saying, Let neither man nor beast, herd nor flock, taste anything; do not let them eat, or drink water. But let man and beast be covered with sackcloth, and cry mightily to God; yes, let every one turn from his evil way and from the violence that is in his hands. Who can tell if God will turn and relent, and turn away from His fierce anger, so that we may not perish?

Then God saw their works, that they turned from their evil way; and God relented from the disaster that He had said He would bring upon them, and He did not do it.
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God and Time

- Deist view: God created time and the universe.

- Theist view 1: Time already existed and God created the universe within it.

- Theist view 2: God created time and the universe then place himself within it.
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A Small God

- A truly small God. Zeus having been trick by Hypnos, the god of sleep wakes up.
- He can use is all powerful eyes he sees instantly all that is happening on the battle field between the Greeks and the Trojans.
As our knowledge of the universe has increased. So the power of our gods increases.

Our God is now God over billions of galaxies each with billions of stars.
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Newtonian Mechanics

- Time is a line.

- The time is the same at all points in the universe.
- Theism: God's time is the same as our time.
- At each moment of time God sees the entire universe.
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Relativity

- Einstein theory of relativity (Special and General) says that space and time are combined into a single entity called spacetime.
- The speed of light (in a vacuum) is the same for everyone.
- The theory of relativity is the standard theory.
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Neutrinos?
**Battleships**

- Before talking about spacetime, let's look at dimensions.
- We say space is 3-dimensional. That is, we need 3 numbers to specify a point in space.

In the game “Battleships” one must indicate the position of the intended target by specifying two numbers. The distance east $x$, followed by the distance north $y$. This is because the game takes place on a two-dimensional surface, i.e., the surface of the sea.
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In Battle Submarines, you need three numbers $x$, $y$ and $z$ to specifying the position.
**Spacetime**

- **When we combine space and time, we create a 4-dimensional object called spacetime.**

- A single point in spacetime is called an event. It requires four numbers to specify it.
  - 3 numbers to give the point in space
  - 1 number to give the time it happens.

- For example an important event in my life:
  - Bromley hospital (51.4070°N 0.0210°E)
  - 8 meters high (Third floor)
  - Midnight 1st May 1968

- Unfortunately I only have a 2 dimensional screen. So I will not draw all 4 dimensions.
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Spacetime diagrams

- Space and time have the same footing in Special Relativity.
- Consider Bob. His home and school are 4km apart on a straight road. One day he leaves his home at 8:30am and walks to school which takes 1 hour. (He is late)
  He stays at school until 12pm and then walks home.
- His spacetime diagram for the morning looks like.
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Spacetime diagrams

- In special relativity we label the vertical axis time $t$ (in seconds) and the horizontal axis displacement $x$ (in light seconds).
- Given these axes, then light travels on $45^\circ$ diagonal lines.
- Every object with mass must travel along curves with slopes above $45^\circ$.
- Nothing can travel faster than light, so nothing can travel along paths with slopes below $45^\circ$. 
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![Spacetime Diagram](attachment:spacetime_diagram.png)
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Spacetime diagrams

An event (e.g. my Birth) divides spacetime into three parts.

- Events outside of the future and past of my birth.
- Events in the past of my birth. These are the only events which can influence my birth.
- Events in the future of my birth. These are the only events which my birth can influence.
Spacetime diagrams

- But space has three dimensions \((x, y, z)\) therefore spacetime has four dimensions \((t, x, y, z)\).
- However I can only draw three dimensions so I shall draw one of time and two of space \((t, x, y)\).
- The division of spacetime in future, past and elsewhere of a point is a double cone, called the lightcone.
The space of **Now**

- In special relativity, there is a notion of **Now**.
- That is for each event there is a collection of events which “at the same time”.

![Diagram](image-url)
However this space of “Now” depends on the motion of the person.

This is similar to a rotation.

But since time is different to space, it is a slightly strange rotation.

This is so that the speed of light is the same.
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Theism: Gods Time.

- In Newtonian Mechanics, God’s time was easy. God’s time was our time.
- In Relativity there is a problem.
- If God is in time, then He must choose His TIME.

- Of course God could choose any time.
- Should we not be able to detect Gods time?
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Just pick out time

- An easy solutions: Can we not simply pick our time?
- But the earth moves. It changes its velocity.

- It moves at 108,000 km/h though space.
- Thus about 3 billion light years away: The Now will be going backwards in time.
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General Relativity

- General relativity is relativity including Gravity.
- It is one of most beautiful theories in Physics.
- Unfortunately it needs a bit of maths:
  - Special relativity is taught in first and second year undergraduate physics.
  - General relativity has to wait until forth year.
- General relativity says that massive objects create gravitational fields with deform (curve) spacetime
- It describes Black Holes and the Big Bang.
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General Relativity: God’s time

- Here the problem is even worse.
- The **Now** depends on the path.
- A star with a massive object in between will have several “Now”s.

**Einstein’s Cross.**

Hubble Space Telescope has provided astronomers with the most detailed image ever taken of the gravitational lens G2237 + 0305. The photograph shows four images of a very distant quasar which has been multiple-imaged by a relatively nearby galaxy acting as a gravitational lens.
Einstein ring formed by gravitational lens, Object SDSS J120540.43+491029.3 found on the SLOAN Digital Sky Survey.

Image by the Hubble Space Telescope
Deism is the answer?

- God now gazes upon the whole of spacetime.

- But now the future is fixed.

- We may pray for comfort, but we can no more pray for something in the future than pray for God to change something in the past.
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Such a God would live in a higher dimensional universe.

Our universe has 4 dimensions.

He needs at least 5.

But does He have His own experience of time. Then He would live in a 6 dimensional universe.
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Deism, Miracles

- God could perform a miracle.

- The effect of this miracle spreads out at the speed of light.
- But now there are 2 universes. One with the miracle, one without.
- There are lives in one universe, which are not in the other.
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- God could have several universes:
  - He has his chosen universe, with just the right amount of miracles. The best of all possible world.
  - But now there are other discarded universes.
  - How do we know we are not living in one of these?
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Ad infinitum

- God’s God?
Summary

- Theist who talk about God and Time, usually assume a Newtonian point of view. That everybody’s time and God’s time is the same.
- But we have known for over 100 years that this is not the case.
- The idea of God out of time is an old one. But this also has problems.

Perhaps only God knows.
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