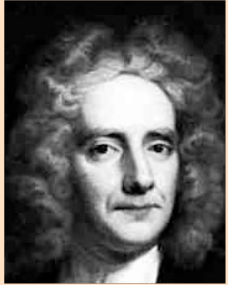


09. The Leibniz-Clarke Correspondence

1. Relationism
2. Leibniz's Arguments Against Absolute Space

- Series of letters written in 1715-1716.



Samuel Clarke
(1675-1729)

- Newton's spokesperson.
- Defends *absolutism* (absolute space exists).



Gottfried Wilhelm
Leibniz
(1646-1716)

- Critic of Newton.
- Defends *relationism* (relational theory of space).
- Offers two versions of a "Shift" argument against the existence of absolute space.

Tally:

Against Relationism

- Newton's Bucket

Against Absolutism

- Leibniz's Shift Arguments

1. Relationism

- (1) Descartes' "negative" statement: There is no absolute reference frame separate from all the relative reference frames defined by material objects.

Recall Problem for Descartes:

- (a) The Principle of Inertia requires the existence of privileged reference frames.
- (b) What material objects can be said to define such privileged frames?
(All objects interact potentially with each other.)

- (2) Leibniz's "positive" statement: Space consists of "an order of coexistences".



"...a situation of bodies among themselves"

- In other words: Space consists of the *relations* between material objects.

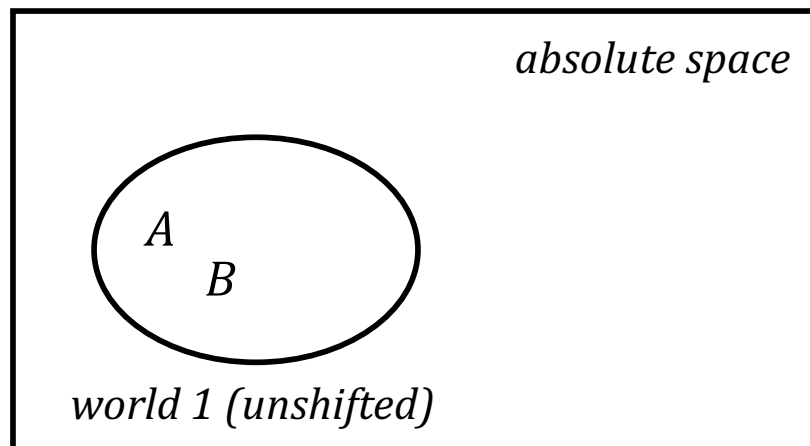
2. Leibniz's Arguments Against Absolute Space.

- First note: Newton's absolute space is *unobservable*.
 - Absolute position (position with respect to absolute space) is unobservable.
 - Absolute velocity (velocity with respect to absolute space) is unobservable.
- Moreover: Recall that positions and velocities *cannot* be detected by experiments governed by Newton's Laws of Motion.
- But: Newton must claim that every material object has a *unique* value of absolute position and a *unique* value of absolute velocity.
- Thus: Newton's theory of motion requires the existence of quantities (absolute position and absolute velocity) that are *in-principle unobservable*.
- Note: This *doesn't* hold for *absolute acceleration*, since it is observationally detectable (it always comes accompanied by inertial forces).

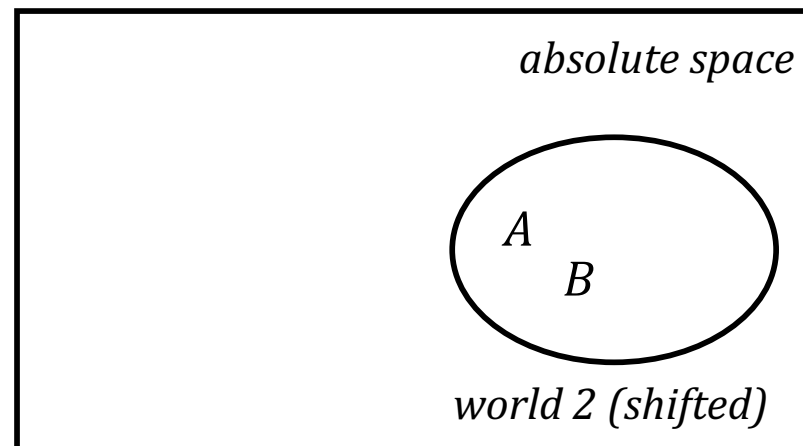


The "Static" Shift Set-Up

- Suppose: Absolute space exists.
- Then: The following two universes must be possible:



Universe 1

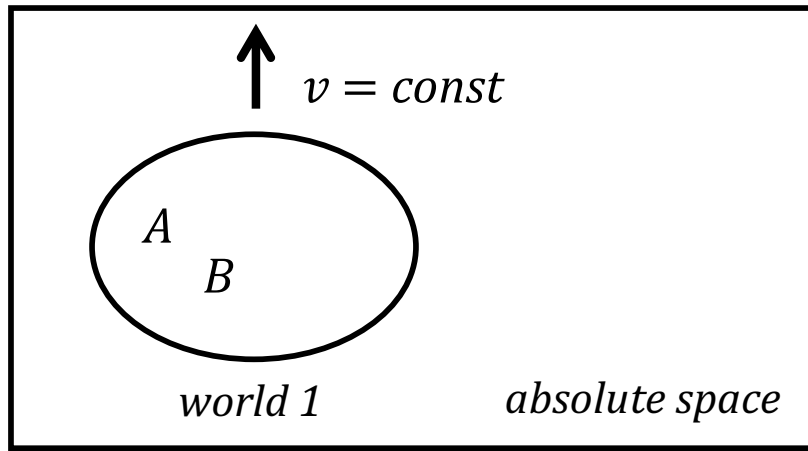


Universe 2

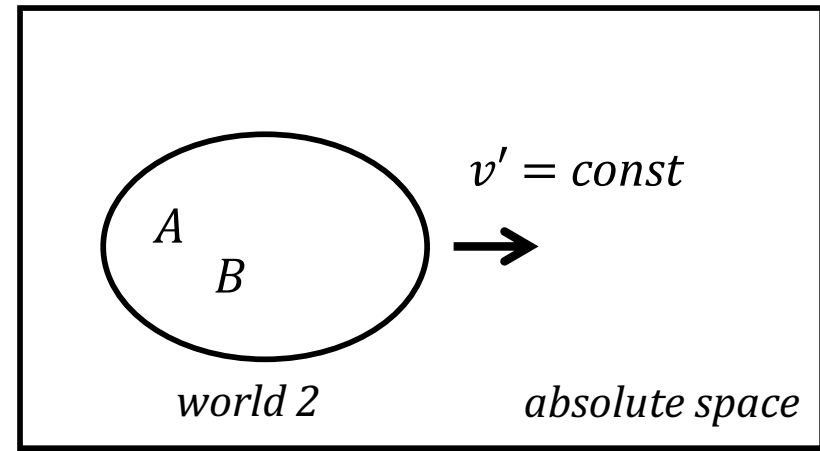
- Now: Assume all relations between objects (like *A* and *B*) are the same in both the shifted and the unshifted worlds.
 - *An absolutist must claim the static shift produces distinct worlds: They differ on their values of absolute position.*
 - *A relationist can claim that the static shift does not produce distinct worlds: Since the relations between material objects are unaffected (and there's no such thing as absolute space), the worlds are not distinct.*

The "Kinematic" Shift Set-Up

- Suppose: Absolute space exists.
- Then: The following two universes must be possible:



Universe 1



Universe 2

- Now: Assume all relations between objects (like *A* and *B*) are the same in both the shifted and the unshifted worlds.
 - *An absolutist must claim the kinematic shift produces distinct worlds: They differ on their values of absolute velocity.*
 - *A relationist can claim that the kinematic shift does not produce distinct worlds: Since the relations between material objects are unaffected (and there's no such thing as absolute space), the worlds are not distinct.*

Leibniz's Shift Argument Against Absolute Space, Version 1.

The Principle of Sufficient Reason (PSR)

Nothing happens without a sufficient reason.

"...for anything that is the case, there's a reason why it should be so rather than otherwise."



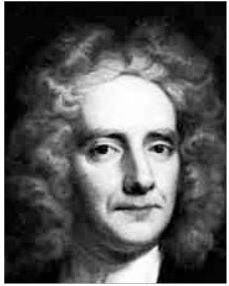
Claim: The existence of absolute space violates the PSR.

- Suppose absolute space exists.
- Then the universe would have been created at some particular location in absolute space, or with some particular uniform velocity.
- But there is no sufficient reason why it should have this particular location, or this particular uniform velocity.



"God could not possibly have had a reason for putting the material universe in space in this way rather than in some other way that retained the same spatial relations of bodies to one another."

Clarke's Response:



"...consider two material things...that are exactly alike and are in different places. Why are they situated as they are rather than the other way around? Why is x here and y there, rather than y here and x there? So far as bits of matter are concerned, one place is the same as another, so that if the locations of x and y had been switched *it would have been exactly the same thing*. So the only reason there *can* be for the two things to be where they are rather than *vice versa* is the mere will of God."

- God's will is reason enough.

"...[This is] contrary to the wisdom of God because it implies that he could act without acting by reason".



- What does it mean to claim God is rational?
 - *Always acts rationally?*
 - *Constrained by reason?*

Leibniz's Shift Argument Against Absolute Space, Version 2.

The Principle of the Identity of Indiscernibles (PIdIn)

If two things are indiscernible, then they are identical.

"There is no such thing as a pair of individuals that are indiscernible from each other."



Claim: The existence of absolute space violates the PIdIn.

- Suppose absolute space exists.
- Then there could be 2 worlds (statically or kinematically shifted from each other) that are *indiscernible*.
- But they would not be *identical*, since they disagree on their absolute positions, or absolute velocities.

"'Suppose x and y are two indiscernible things' comes down to 'Suppose x is y , and that this thing has two names. What does this imply about the hypothesis that the universe could right from the outset have had a different spatial and temporal location from what it actually had, with everything else about it--including the spatiotemporal interrelations among parts of the universe--remaining actually the same? It implies that the hypothesis is an impossible fiction."





"To say that God can make the whole universe move in a straight line (or any other line!) without changing it in any other way is another fantasy. For two states indiscernible from each other are the same state, so that this 'movement of the entire world along a straight line' is a change that doesn't change anything."

- Question: What does it mean to say two things are *indiscernible*?

"The author [Clarke] replies now, that the reality of motion does not depend upon being observed; and that a ship may go forward, and yet a man, who is in the ship, may not perceive it. I answer, motion does not indeed depend upon being observed; but it does depend upon being possible to be observed. There is no motion when there is no change that can be observed. And when there is no change that can be observed, there is no change at all."

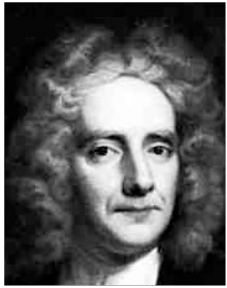


- Thus: A discernible difference is an in-principle observable difference.
- Principle: If two things cannot be distinguished by any *possible observation*, then they are identical.
- An empiricist principle...

The Verifiability Principle of Meaning

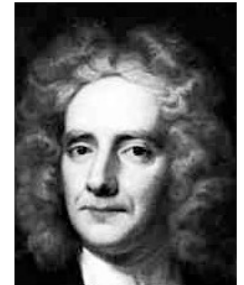
A claim is meaningful just when it can be *verified* (just when a set of observations exist that would establish the truth of the claim).

- An early 20th-century (logical positivist) descendant of PIdIn.
 - *Suggests: The claim that absolute space exists is not verifiable, and thus meaningless.*
- But: Are all properties of material objects that Newton associates with absolute space unverifiable?
 - *Absolute position: unverifiable (basis for Static Shift).*
 - *Absolute velocity: unverifiable (basis for Kinematic Shift).*
 - *Absolute acceleration: verifiable!*
- Suggests a counter-argument against relationism...



"If a ship is sailing smoothly enough, a man shut up in the cabin can't tell whether it is moving or not; but that doesn't alter the fact that its *moving* and its *not moving* are not the same state! Whether or not the locked-up man can detect it, the motion of the ship is a real state with real effects...and if the ship suddenly stopped, that would yield other real effects; as would a sudden stopping of an indiscernible motion of the universe."

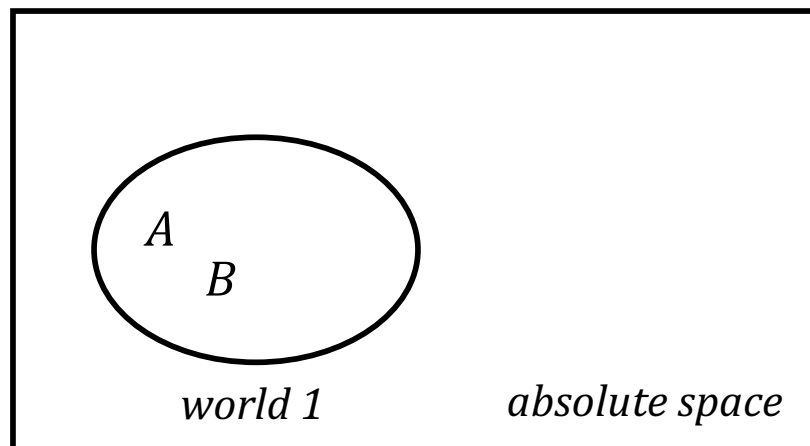
"Newton emphasizes this at length in his *Mathematical Principles*... [He] shows from real effects that there may be real [absolute] motion in the absence of relative motion, and relative motion in the absence of real [absolute] motion."



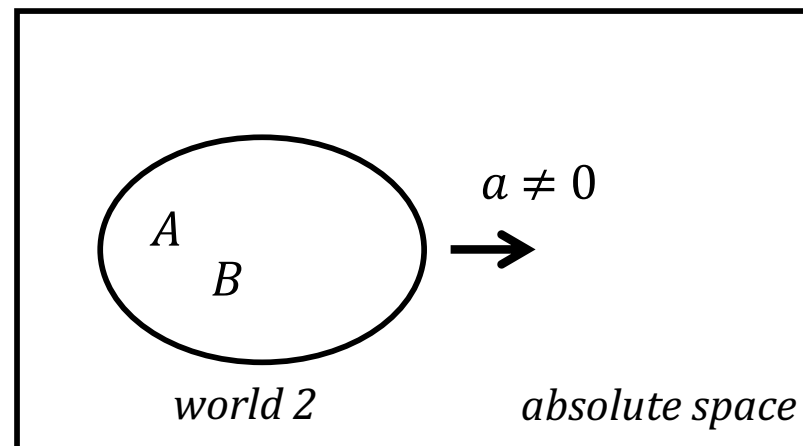
- Recall Newton's Bucket and Globes thought experiments.
- Suggests a "Dynamic Shift" argument against the relationist...

The "Dynamic Shift" Set-Up:

- Suppose: Absolute space exists.
- Then: The following two universes must be possible:



Universe 1



Universe 2

- Now: Assume all relations between objects (like *A* and *B*) are the same in both the shifted and the unshifted worlds.
 - *The shifted and unshifted worlds are observationally distinct: World 2 experiences a force while world 1 does not.*
 - *An absolutist can claim this observable difference is due to the fact that the worlds differ on their values of absolute acceleration.*
 - *Can a relationist account for this difference?*

Leibniz's response:



"I grant that there is a difference between an absolute true motion of a body, and a mere relative change of its situation with respect to another body. For when the immediate cause of the change is in the body, that body is truly in motion; and then the situation of other bodies, with respect to it, will be changed consequently, though the cause of that change be not in them."

- The type of motion that a relationist needs to explain is accelerated motion, which comes accompanied by forces.
- An absolutist explains the presence of these forces as motion with respect to absolute space.
 - *For an absolutist, absolute acceleration is a two-place relation between a material object and absolute space.*
- Leibniz suggests that the explanation of the presence of these forces is "in the body" undergoing acceleration.
 - *For Leibniz, absolute acceleration is a one-place (monadic) property that a material object either does or does not possess.*