

# WHAT IS TIME?

## 1. Change & The Cycles of Nature

- Time **NOT** an independently existing entity.
- Time dependent on motion in environment.

## 2. Galileo & Newton's Time

- Time becomes a constant, independently existing entity.
- Motion dependent on time.

## 3. Einstein's Time

- Time no longer constant.
- Time tied to the fabric of space, changes with motion.
- So time is all "out there" just as all dimensions of space are "out there".

# EINSTEIN'S TIME

**What are some strange implications of this?**

1. Time travel possible?
2. ...

# PHILOSOPHY OF TIME TRAVEL (PARADOXES GALORE)

**Is time travel philosophically possible?**

- **All You Zombies**
- Changing the Past Paradox
- Grandfather Paradox
- No Tourist Argument

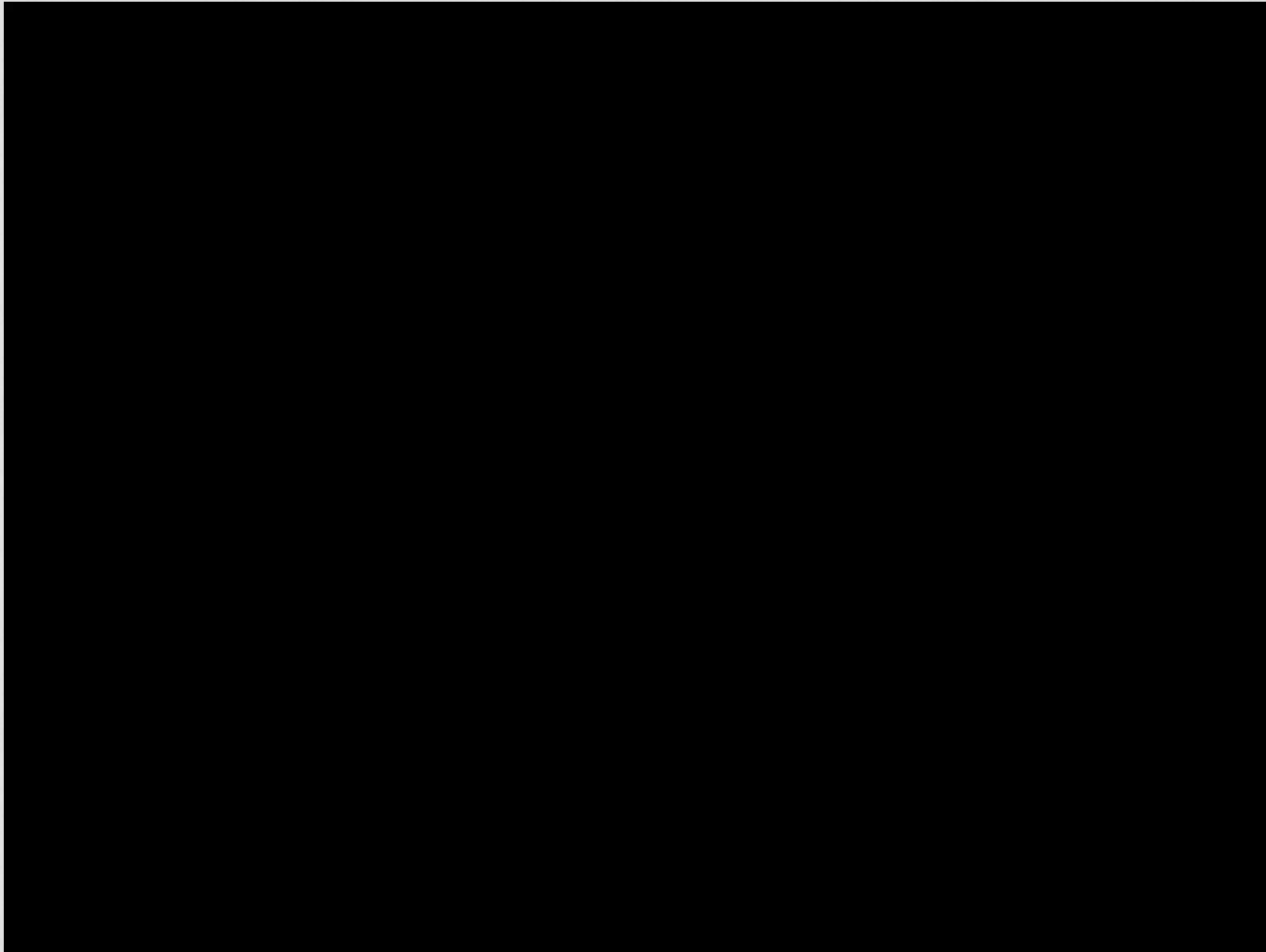
# PHILOSOPHY OF TIME TRAVEL (PARADOXES GALORE)

## All You Zombies

<http://learnodo-newtonic.com/all-you-zombies-paradox-robert-heinlein>

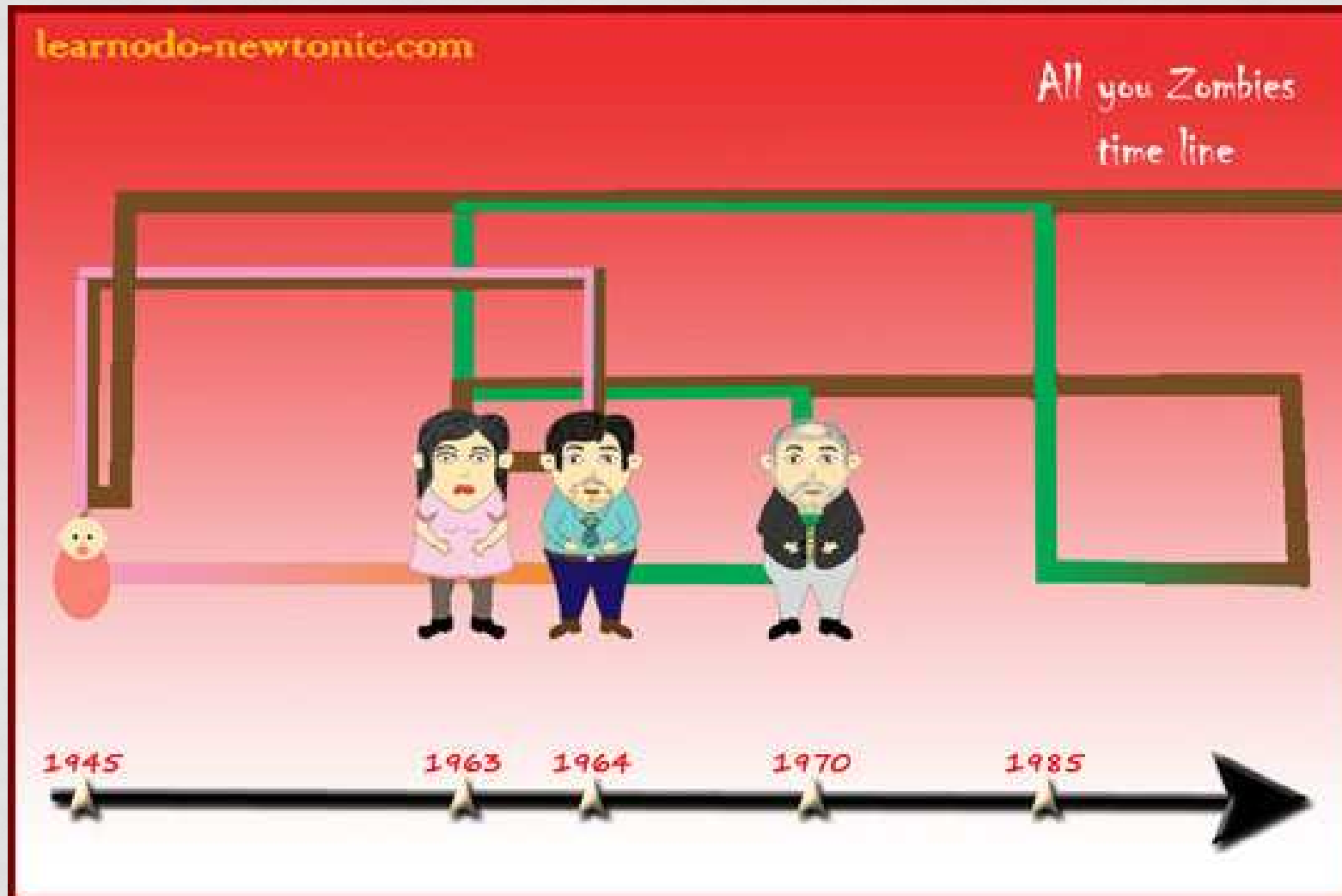


# PHILOSOPHY OF TIME TRAVEL



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# PHILOSOPHY OF TIME TRAVEL





# PHILOSOPHY OF TIME TRAVEL

## All you Zombies

- September 20, 1945, the Bartender drops off baby Jane at an orphanage.
- April 3, 1963, Bartender drops off "unmarried mother" (UM) where he meets and dates the 17-year-old Jane.
- After UM seduces Jane, to her looks like he disappears; actually retrieved by the Bartender, and taken to 1985.
- Jane becomes pregnant, gives birth, is found to be a "true hermaphrodite", and on waking she learns that she has been subjected (without her consent) to a sex change.

# PHILOSOPHY OF TIME TRAVEL

## All You Zombies

- On March 10, 1964, the Bartender steals the baby and takes it back in time to the orphanage.
- On November 7, 1970, the Bartender meets the Unmarried Mother, takes him into the back office, and takes him back to 1963 to "find" the man who got him pregnant.
- On August 12, 1985, the Bartender brings the Unmarried Mother to the Rockies base and enlists him in the Temporal Bureau.
- On January 12, 1993, the Bartender, who is also Jane/mother/father, arrives back at his base from 1970 to think about his life.



# PHILOSOPHY OF TIME TRAVEL

**All You Zombies**  
*Is this possible?*

*You are your own mom  
...and dad  
...and grandfather  
...and grandmother  
..and...and...and...*

***He/she is his/her own  
family tree!!***



# PHILOSOPHY OF TIME TRAVEL

## **All You Zombies**

*Is this possible?*

*Three objections:*

- 1. Backward Causation*
- 2. No Destination*
- 3. In Two Places at Once Paradox*

# PHILOSOPHY OF TIME TRAVEL

## The Objection from Backward Causation

- We usually think of the past causing the future.
  - Study (usually) causes the effect of a good grade
  - Hitting a cue ball causes it to hit other balls on a pool table.
- But, if you father yourself then the effect of that procreation is also the cause!
- Like getting a good grade **causing** you to have already studied!
- *How would you counter this objection?*

# PHILOSOPHY OF TIME TRAVEL

## The 'No Destination' Objection

- If you haven't been paying attention today, you may still believe...
  - That the past no longer exists
  - That the future doesn't exist yet
  - That only the present time exists
- If these are true, then time travel impossible because there's no other time to travel to.
- *How would you counter this objection?*

# PHILOSOPHY OF TIME TRAVEL

## Counter to the 'No Destination' Objection

- Time & space exists as 4-Dimensional space-time
- It only seems like the past and future don't exist because we are not aware of them
- 4-Dimensional space-time is widely accepted in physics... and...
- Einstein said its true!



# PHILOSOPHY OF TIME TRAVEL

## The “In two Places at Once Paradox” Objection

- No one person can wholly be in two places at once
  - Wholly is important here
- If you believe this, (which you should) then doesn't that mean time travel is impossible?
- Makes no sense to say I am here and there at the same time.
- *How would you counter this objection?*

# PHILOSOPHY OF TIME TRAVEL

## Counter to The “In two Places at Once Paradox” Objection

- No such thing as being wholly in one spot. Try it? Where are you “wholly” right now?
  - Different parts of you are in different parts in space.
- But Einstein said we also exist extended in time.
- So always in more than once place in both space and time.
- So maybe the sound of one hand clapping is a pretty good sounding clap
  - (if the one hand from the future comes back to clap with itself in the present)

# PHILOSOPHY OF TIME TRAVEL (PARADOXES GALORE)

## Is time travel possible?

- All You Zombies
- **Changing the Past Paradox**
- Grandfather Paradox
- No Tourist Argument

# THE PARADOX OF CHANGING THE PAST

- If you could go back in time, you could do more to study for the test and get a better mark
  - But, you already have a mark! You can't change it – its part of history now!
  - P1) If time travel is possible, then you could change the past
  - P2) It is never possible to change the past
- 
- C) Therefore, time travel must not be possible
  - *Can you think of solutions to the paradox?*

# REPLYING TO THE PARADOX OF CHANGING THE PAST

- Denying P1: Time travel *is* possible, but it does *not* and *cannot* change the past
  - When you time travel, you create a new alternate universe
    - So you can change things, but not things from *the past in our universe*
  - When you time travel, you can affect the past because you *already did*
    - You don't change history... you helped create it.



# PHILOSOPHY OF TIME TRAVEL (PARADOXES GALORE)

## Is time travel possible?

- All You Zombies
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# THE GRANDFATHER PARADOX

- If you could go back in time, you could kill your grandfather before he could produce any offspring
- But, if you did that, then there would have been no you to make a time machine and go and kill him!
- Which means that you can't have killed him...



# THE GRANDFATHER PARADOX (CONT.)

- P1) If time travel is possible, then you could kill your grandfather (before he had kids)
  - P2) It is impossible for you to have existed if you succeed in killing your grandfather (before he had kids)
- 
- C) Therefore, time travel must not be possible
  - How could you solve this paradox?

# REPLYING TO THE GRANDFATHER PARADOX 1

- Denying P1: Time travel *is* possible, but you *do not and cannot* kill your grandfather
  - When you time travel, you create a new alternate universe
    - So you can kill some old guy... but it's not *your* grandfather (not from *your* past)
  - But does time travelling to an alternate universe really count?
    - Is it time travel or inter-universal travel?
    - For time travel to be meaningful does it have to be to *our own past*?



# REPLYING TO THE GRANDFATHER PARADOX 2

- Denying P1: Time travel *is* possible, but you *do not and cannot* kill your grandfather
  - When you time travel, you can affect the past, but only because *you already did*
    - This works in “All You Zombies”, but
    - This justification doesn’t work this time
    - E.g. If you had already been there and killed your grandfather... then you would never have existed



# REPLYING TO THE GRANDFATHER PARADOX 3

- Denying P1: Time travel *is* possible, but you *do not and cannot* kill your grandfather
  - When you time travel, you can attempt to kill your grandfather, but you will never succeed (somehow)



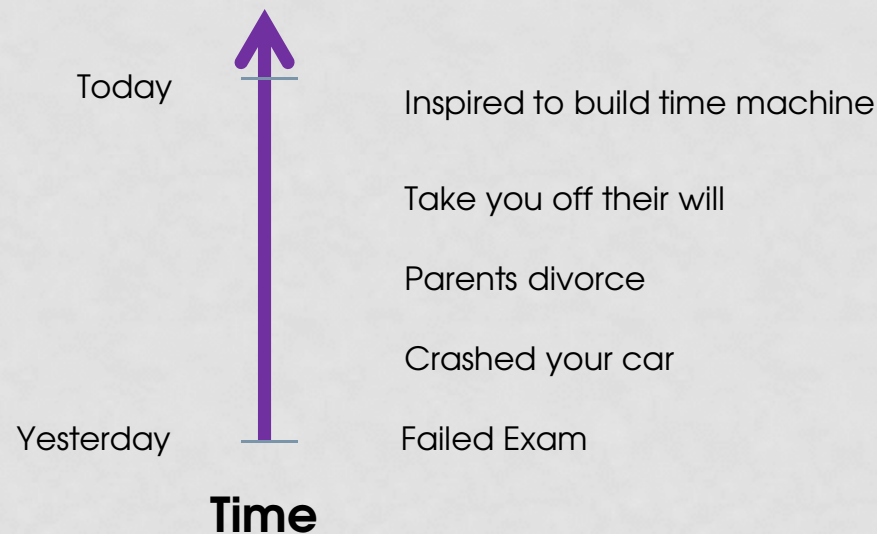
# **REVIEW:** PHILOSOPHY OF TIME TRAVEL (PARADOXES GALORE)

**Is time travel philosophically possible?**

- All You Zombies
- Changing the Past Paradox
- Grandfather Paradox

# REVIEW: PHILOSOPHY OF TIME TRAVEL (PARADOXES GALORE)

## Common Solution – Alternative Timelines

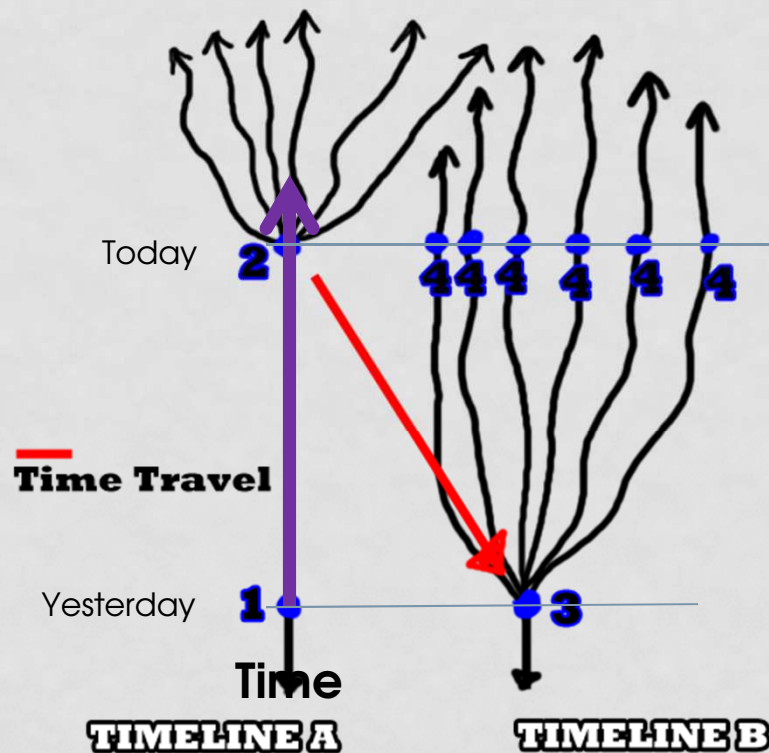


Get into TM:  
Let's go back and retake  
the exam!

But you can't change your  
own past right?

# REVIEW: PHILOSOPHY OF TIME TRAVEL (PARADOXES GALORE)

## Common Solution – Alternative Timelines



But is this really "time traveling" or just universe jumping?



# PHILOSOPHY OF TIME TRAVEL (PARADOXES GALORE)

## Is time travel possible?

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# OK FINE, BUT WHERE ARE THE TIME TRAVELERS, THEN?

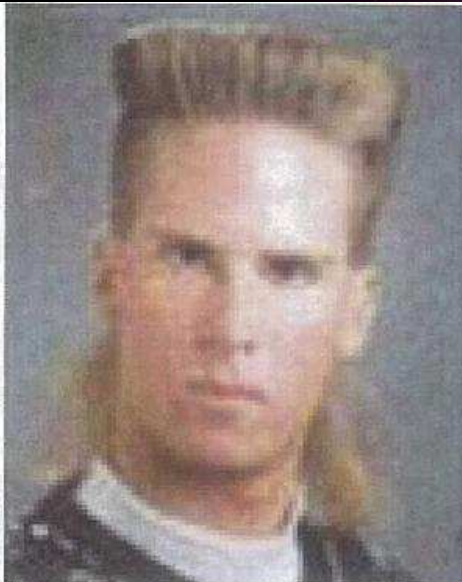
- P1) If time travel ever becomes possible in the future, then time travelers would most likely have visited our past already
  - P2) But there is no evidence of time travelers in our past
  - P3) It is very unlikely that the time travelers could have left no evidence
- 
- C) Therefore, it's very unlikely that time travel ever becomes possible
  - How could you address this objection?

# REPLYING TO THE NO EVIDENCE OF TIME TRAVELLERS PROBLEM 1

- Accept the argument
  - It's true that there are no time travelers... but only because:
    - Global warming, or
    - Nuclear war, or
    - Super-viruses, or
    - The robotic uprising of the (very) late nineties...
  - ... killed off all of the humans before we got around to making time machines!

# REPLYING TO THE NO EVIDENCE OF TIME TRAVELLERS PROBLEM 2

- Denying P2: There is evidence of time travelers!
  - John Titor [www.johntitor.com](http://www.johntitor.com)
  - That guy who went under his sink (Hakan Nordkvist)
    - <http://www.youtube.com/watch?v=qBUv4j3DINE>
  - That mullet guy



**WANTED: Somebody to go back in time with me. This is not a joke. P.O. Box [redacted], Oakview, CA 93022. You'll get paid after we get back. Must bring your own weapons. Safety not guaranteed. I have only done this once before.**



# REPLYING TO THE NO EVIDENCE OF TIME TRAVELLERS PROBLEM 3

Denying P1:

Only when time travel becomes possible (by a human creating and turning on a time machine – a closed time-like loop) would we expect to start seeing things appear from the future (Dr. Mallett).

- So, we won't expect to see *anything* until the first closed time-like loop is set up

# PHILOSOPHY OF TIME TRAVEL

Discussion:

- Based on the philosophical arguments and paradoxes does time travel seem logically possible?
  - If not, what would Kant say about that?
- Which argument against time travel do you find the most convincing and why?



# CHOICES

Let's list examples of "choices" you've made today...

# WHAT IS TIME? MODERN TIME

## Einstein's Time

- What are some strange implications of this?
  1. Time travel possible?
  2. **Future already set: *So what?***
    - If so, do we have any choice in the matter?

# WHAT DO YOU BELIEVE?

- Do you believe in cause and effect – that every event has a cause?
- Do you believe your behavior is determined by your genes and past experience?
- Do you believe in a completely material world (devoid of an immaterial spirit or soul)?
- Do you believe in the laws of physics?
- Do you believe in an all-knowing God?
- Do you believe in destiny or fate?

## Problem:

If you said yes to any of these, you may have a problem justifying the existence of **free will**.

# THE BIG QUESTION

Do you have free will?

# FREE WILL

**What do you think this means?**

Popular Definitions:

- the ability to **freely** and **consciously** choose between two or more options, either on the spot or after deliberation.
- the ability to have chosen differently than we did.



# FREE WILL VS. DETERMINISM

- What kind of proof could I show you to make you believe that your actions are predetermined, and you do not have free will?

DO YOU HAVE FREE WILL?

