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
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?
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)
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 – it’s 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
- Changing the Past Paradox
- Grandfather Paradox
- No Tourist Argument
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…
• 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)
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

Yesterday

Today

Inspired to build time machine
Take you off their will
Parents divorce
Crashed your car
Failed Exam

Get into TM: Let’s go back and retake the exam!
But you can’t change your own past right?
Common Solution – Alternative Timelines

But is this really “time traveling” or just universe jumping?
PHILOSOPHY OF TIME TRAVEL
(PARADOXES GALORE)

Is time travel possible?

• All You Zombies
• Changing the Past Paradox
• Grandfather Paradox
• No Tourist Argument
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
  • 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?