

# BEGINNING OF CLASS

- go-around introduction - NAME & WHY are you interested in the class, what are you working on

- Sign-up for PRESENTATIONS

- OFFICE-HOURS - chance to meet you in person and potentially tailor the reading

- mid-term exam

- MINI-LECTURES

- philosophical basis of the idea of space as PRODUCT

- bare with me as I provide some of the coordinates for understanding the readings

- please FEEL FREE to raise your hand and STOP ME whenever something is UNCLEAR

# MINI-LECTURE - WEEK 1

(1)

• PHILOSOPHICAL BACKGROUND AND CONDITION OF POSSIBILITY  
for THE CENTRAL CLAIM of THIS WEEK -

NAMELY THE IDEA THAT SPACE IS A SOCIAL  
PRODUCT

• SINCE ANTIQUITY PHILOSOPHERS ~~and~~ STRUGGLE TO THEORIZE and COMPREHEND  
the nature of 3 related concept SPACE, TIME, and MOTION.  
This question in a sense lie at the VERY CORE of early  
WESTERN PHILOSOPHY and NATURAL SCIENCES in particular in  
relation to PHYSICAL THEORY and MOTION or the relation  
between TIME & SPACE.

while most of these theory have actually focused, or  
been read or focusing on TIME, to today follow SPACE and  
see how it was theorized by different thinkers.

→ ABSOLUTIST vs RELATIVIST VIEW

Start from ARISTOTLE definition of PLACE of an object as the  
"INNERMOST MOTIONLESS BOUNDARY OF THAT WHICH SURROUNDS IT"

SPACE or ABSOLUTE, EXTERNAL & STATIC (1<sup>st</sup> dominant view)

this remained the dominant view for most of CLASSIC PHILOSOPHY (2) and still today represent our basic intuitive understanding.

SPACE is out-there and exists outside of us, as an

CONTOUR and a CONTAINER of our EXISTENCE

(→ DOREEN HASSEY ON ILLUSIONS)

this IDEA got to its fullest formulation with DESCARTES (1596-1650)

Some of you may be familiar with his work as the philosopher of the distinction between MIND and BODY, ~~or for the CARTESIAN~~ there was

predicated upon the division between a cogito, meaning a thinking being or RES COGITANS and a world outside of this or RES EXTENSA (including SPACE)

IT IS IMPORTANT to keep in mind that he, as well as many other thinkers I will talk about were philosophers, scientists, mathematicians, and astronomers and in so doing dealt with

space, time, and motions BOTH as ABSTRACT CATEGORIES and experimental questions.

In the case of DESCARTES this reflection was also part of his development of the idea of using algebra to represent GEOMETRY the idea

for which the CARTESIAN COORDINATE SYSTEM was named after him. (RES EXTENSA THEREFORE MEASURABLE vs RES COGITANS)

here we see the idea of space as an ABSOLUTE system that exists outside and around the SUBJECT, the same view that

animated the philosophy and science of ISAAC NEWTON (1642-1726)

NEWTON saw space as a CONTAINER, similar to TIME, absolute and of infinite extension, in this objects exist and move in (3)

ABSOLUTE TERMS (hence for instance the idea of GRAVITY as

an ABSOLUTE force that operates equally in the solar system as in tiny objects). (For NEWTON is STATIC while for DESCARTES is RELATIVE)

it was in relation to NEWTON that this ABSOLUTIST VIEW of SPACE was CHALLENGED FOR the first time by a RELATIONAL

theory of space advanced by LEIBNIZ - a theory that sits at the

background of most the ready we did today as well as of things like EINSTEIN relativity ~~or even~~ or HEISENBERG indeterminism principle.

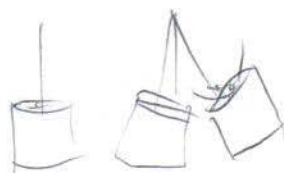
LEIBNIZ was also a philosopher and mathematician who lived at the same time of NEWTON. These two engaged in a number of famous disputes regarding math, philosophy and calculus.

Most important for us is the LEIBNIZ - CLARKE debate

In it LEIBNIZ argued for a understanding of space and time as RELATIVE ENTITIES, only measurable in relation to a point or subject

of reference. (HAYBE SPINNING BUCKET ARGUMENT - FOR CLARKE absolute space

rotate in relation to a third thing - NOW: subject)



The difference between LEIBNIZ view and DESCARTES or NEWTON could NOT BE STARKER (4)

on one side SPACE is ABSOLUTE, REAL, and OUT-THERE.

on the other SPACE is RELATIVE, MIND-DEPENDENT, IDEAL

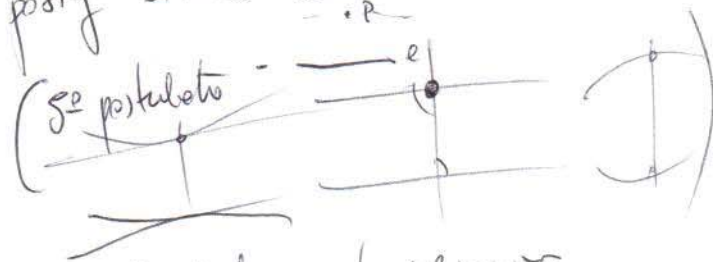
→ WHILE these debates were resolved at the time in favor of NEWTON, and his theory of ABSOLUTE SPACE reigned for basically the following 2 centuries <sup>between the 19<sup>th</sup> and</sup> the beginning of the 20<sup>th</sup> century the idea of RELATIVE SPACE prepotently got BACK around 2 main SCIENTIFIC & PHILOSOPHICAL developments:

• NON-EUCLIDEAN GEOMETRIES

• EINSTEIN'S GENERAL RELATIVITY

→ by the beginning of the 19<sup>th</sup> century around Europe a number of scientists developed the idea of geometries beyond EUCLIDEAN, this was based on the realization that geometry is an arbitrary representation of reality based on postulates.

Questioning these postulates and posing others could create alternative representations of space



↓  
this opens the space for questioning ~~and~~ to ideas of ABSOLUTE SPACE and proposing alternatives

Finally, and maybe most importantly, the idea of ABSOLUTE (5)  
SPACE or something existing out there INDEPENDENTLY from frame  
of reference was taken down in the 20<sup>th</sup> century by EINSTEIN,  
general relativity

• This theory was developed starting from a study of space-time as a  
unified and NOT absolute entity to question the idea of SIMULTANEITY  
The basic idea is that motion varies and affects the space-time  
relation of an object (THEREFORE rotating water in a bucket cannot be  
compared with static water in  
terms of spatio-temporal positioning)

↓  
In 1915 Einstein expanded on this and proposed the general relativity theory  
in which motion is not referred to a background SPACE-TIME

↓  
So to CONCLUDE - this philosophical excursion has shown how  
starting from the LEIBNIZ/CLARKE debate the previous notion of  
absolute space as ABSOLUTE, REAL, and OUT-THERE has been  
questioned by a young idea of RELATIVE SPACE, IDEAL, and  
DEPENDENT on specific point of reference, and RELATIONAL.

→ This idea lies at the core/ or in the background to the  
ready of today - LET'S START by looking at HEIDEGGER