

Title: Welcome to the Edge of the Universe

Date: Nov 03, 2004 02:00 PM

URL: <http://pirsa.org/04110042>

Abstract:



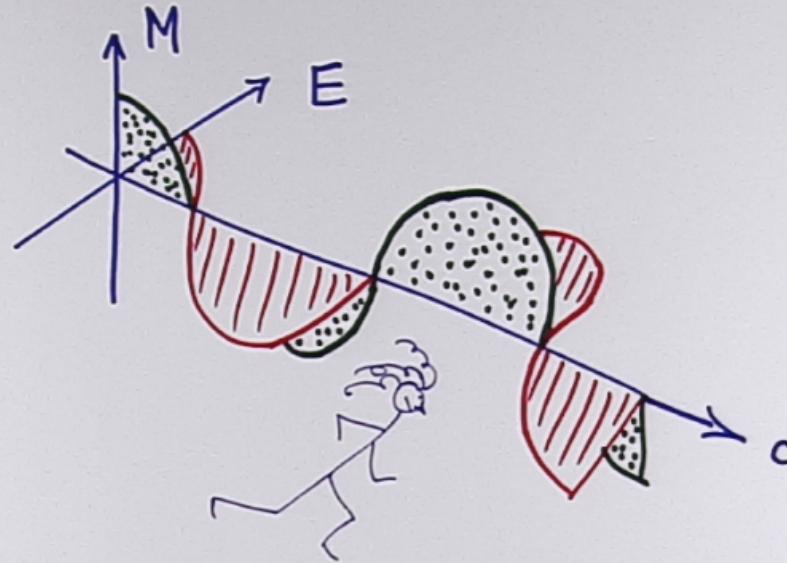


## TEs

- We imagine some situation
  - Let it run
  - See what happens.
- 
- As with a real experiment, many things involved
    - observation
    - calculation
    - conjecture
    - application of theory
- 
- Some do, some do not correspond to real experiments
  - Fallible

## Destructive TEs

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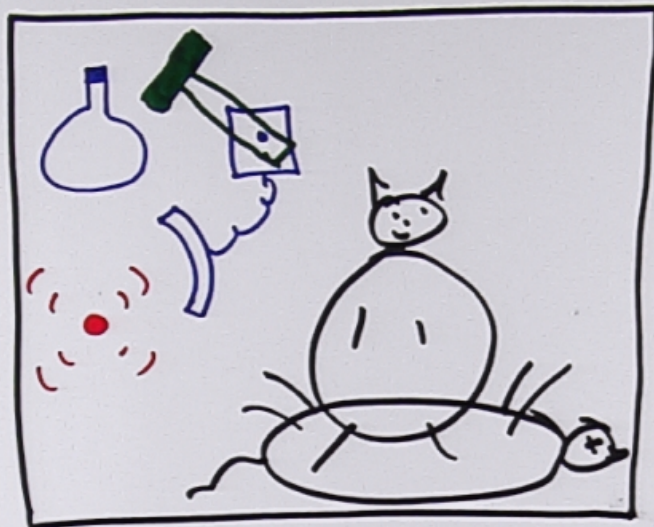


Einstein chases a light beam.

- Internally inconsistent
- Existing theory refuted.

4

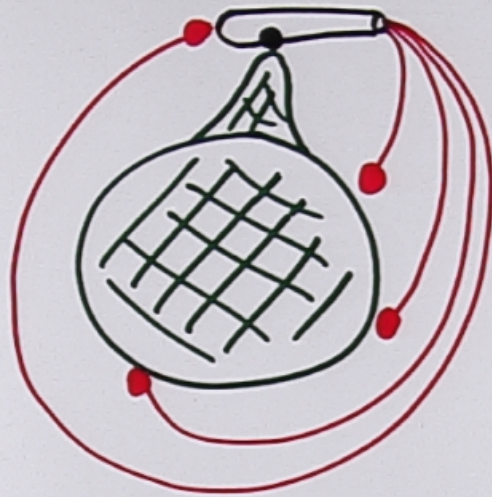
## Destructive TEs (II)



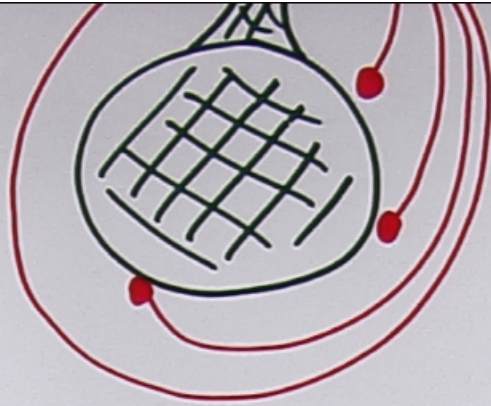
## Schrodinger's Cat

- Inconsistent with external beliefs.
- Existing theory "refuted".

## Mediative TEs



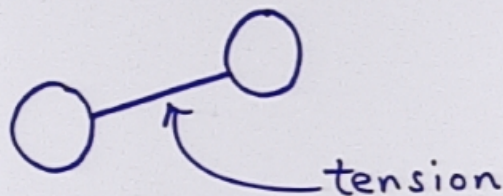
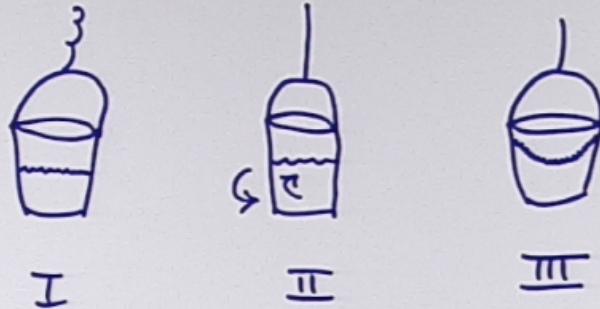
- Gives us an intuitive understanding.
- A pedagogical device
- Maxwell's demon may have this form.



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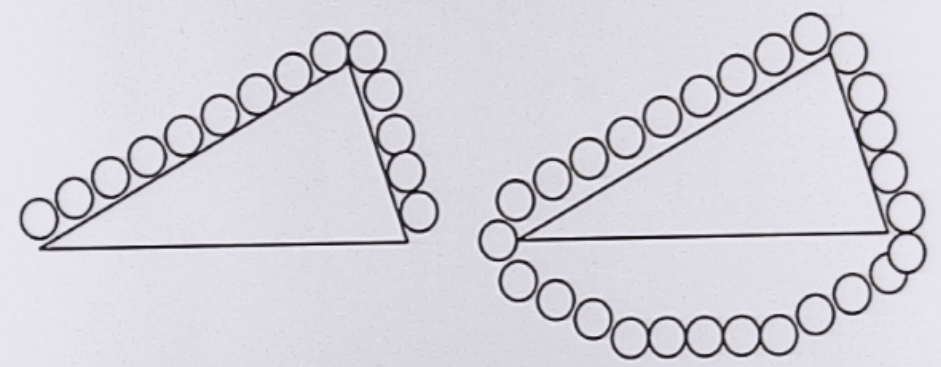
## Conjectural TEs



- Phenomena established by TE.
- Absolute space offered as explanation.
- Mach and Berkeley rejected phenomena, not explanation.

# Direct TEs

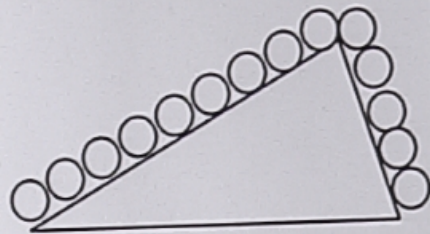
- Stevin



- Lucretius
- Einstein's elevator
- TE leads directly to establish something new.

# Direct

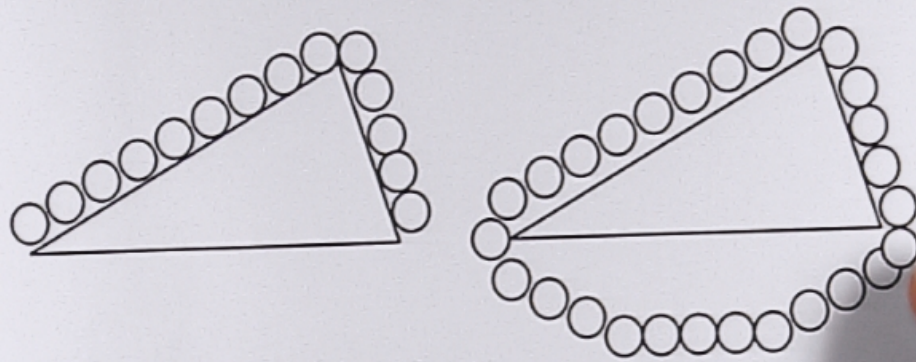
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# Direct TEs

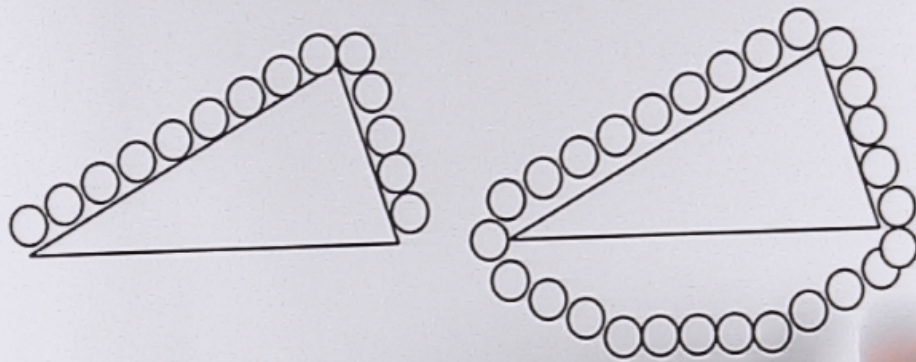
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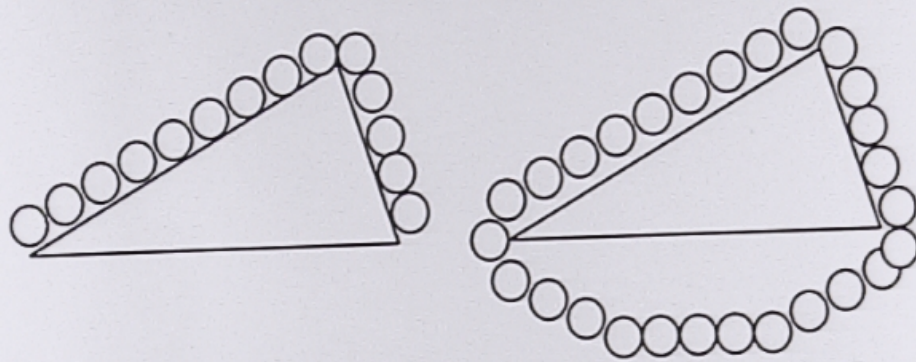
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# Direct TEs

- Stevin



- Lucretius
- Einstein's elevator
- TE leads directly to establish something new.

## TEs with Philosophical Content

- Heisenberg's  $\gamma$ -ray microscope  $\rightarrow$  uncert. pr.
- Poincaré's disk world  $\rightarrow$  conventionality in geometry.
- Einstein's spheres (in Gen. Rel. paper)
- In each case verificationism is adopted.  
P is true (or false) iff  
P can be empirically confirmed (or refuted). Otherwise P is meaningless.



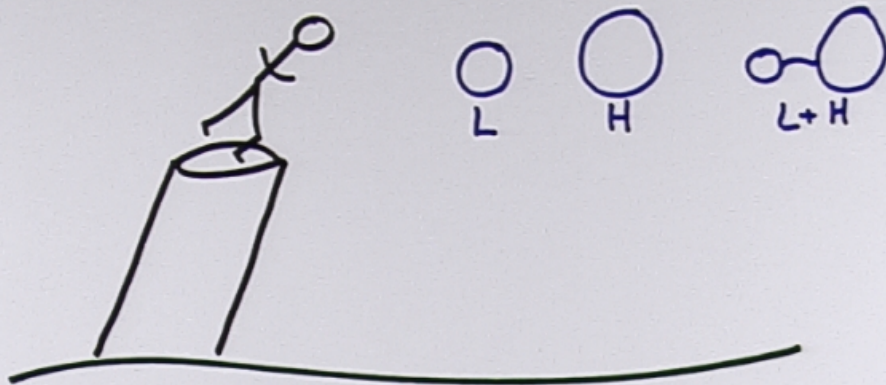


## Question

- Physics, philosophy, and some other fields are full of TEs.
- Chemistry has none.
- Why?



# Platonic TEs



Aristotle :  $H > L$

$\therefore L+H > H$

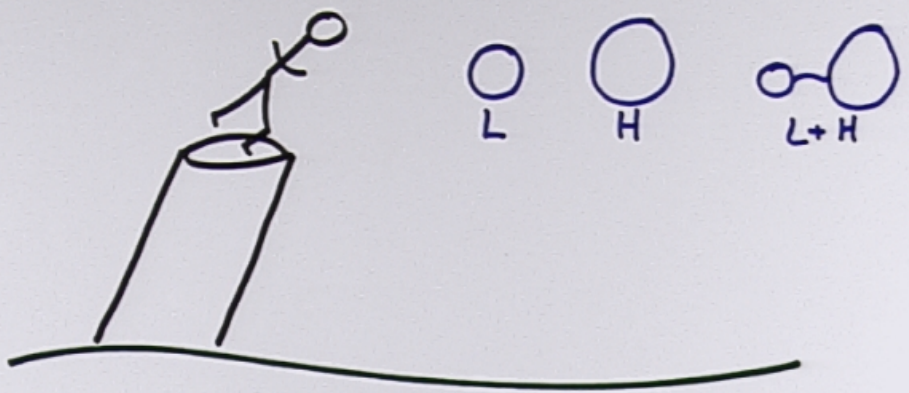
But  $L+H < H$

Absurd

$\therefore L = H = L+H$

- Platonic TEs are simultaneously destructive and constructive.

# Platonic TEs



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## A Priori Knowledge of Nature?

- No new empirical input
- Not a logical truth
- Not a trivial modification of old theory.
- Nice fit with certain views about math and laws of nature.

How is this even possible?

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## Mathematical Platonism

- math objects exist outside spacetime, independent from us.
- We can "see" or somehow "grasp" them.
- Gödel

"... despite their remoteness from sense experience, we do have something like a perception also of the objects of set theory, as is seen from the fact that the axioms force themselves upon us as being true. I don't see any reason why we should have any less confidence in this kind of perception, i.e., in mathematical intuition, than in sense perception, which induces us to build up physical theories and to expect that future sense perceptions will agree with them..."

Upshot: We can "see" abstract entities



# Laws of Nature

What is a law of nature?

Hume: a regularity that we expect

Ramsey-Lewis: any consequence of the axiomatization of all the fact that is maximally strong and simple.

Armstrong-Dretske-Tooley: a relation among properties that necessitates a regularity in the facts.

$$N(R, B) \Rightarrow (\forall x)(Rx \rightarrow Bx)$$



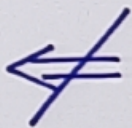
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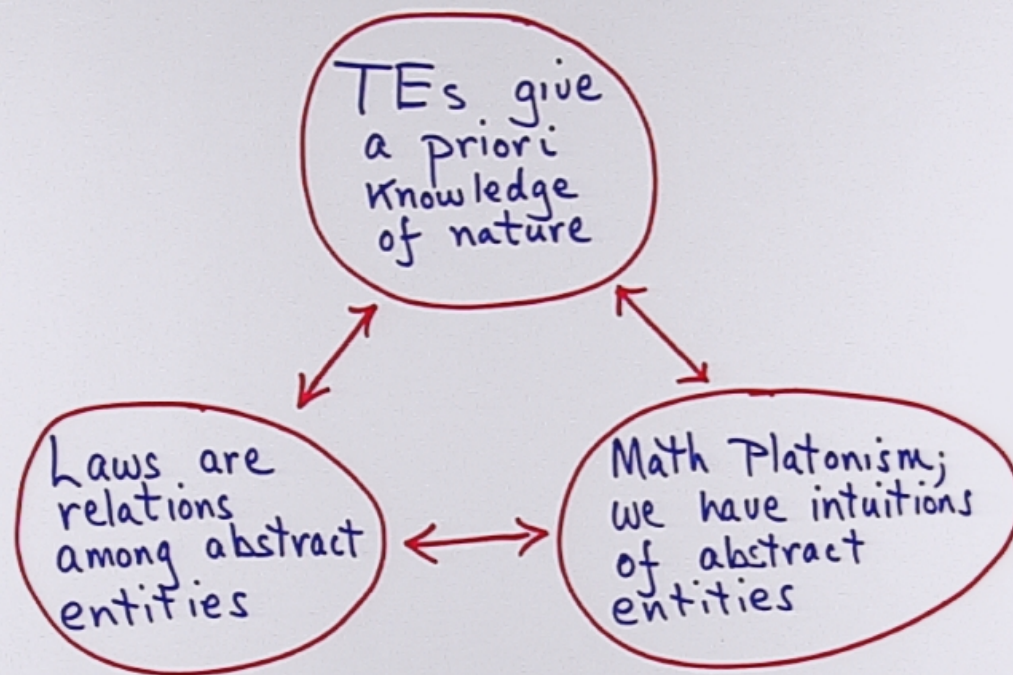
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Main claim: Some TEs provide conditions for "seeing" laws of nature.



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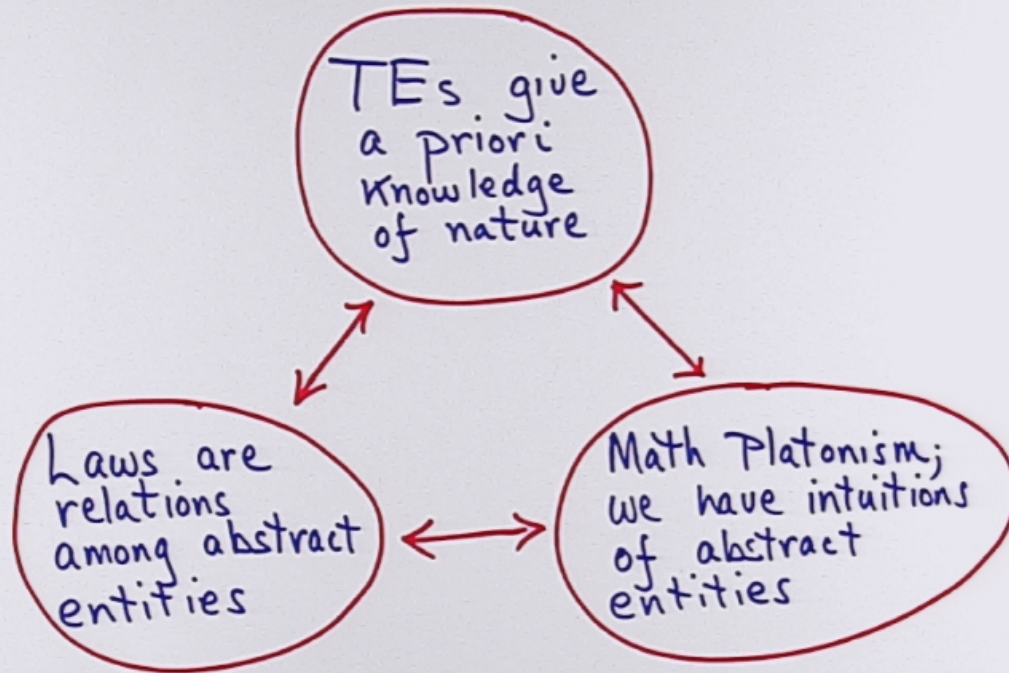
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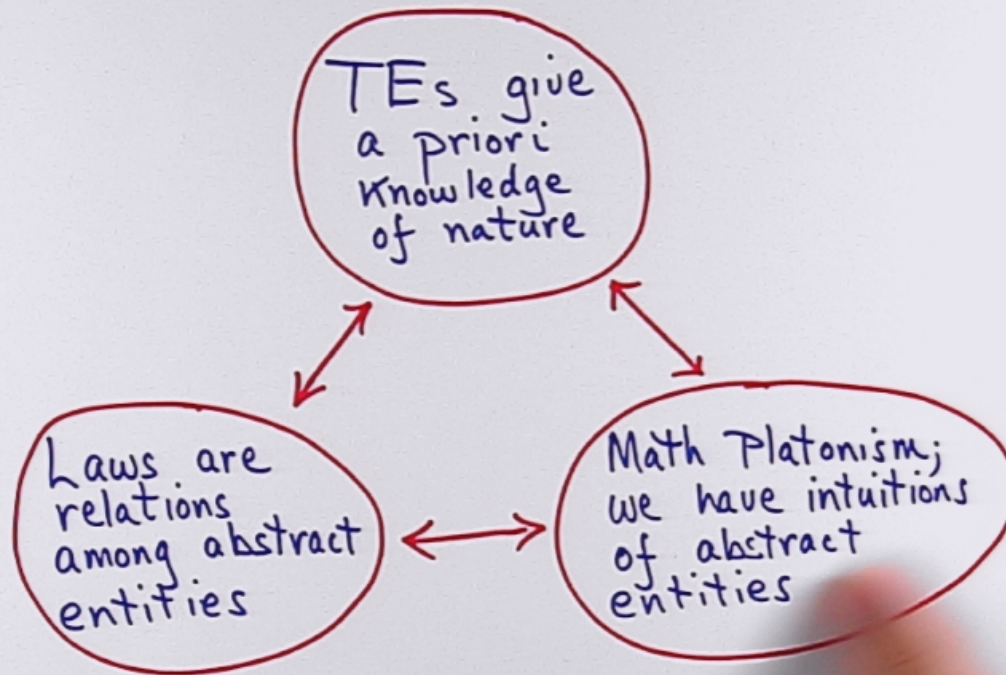
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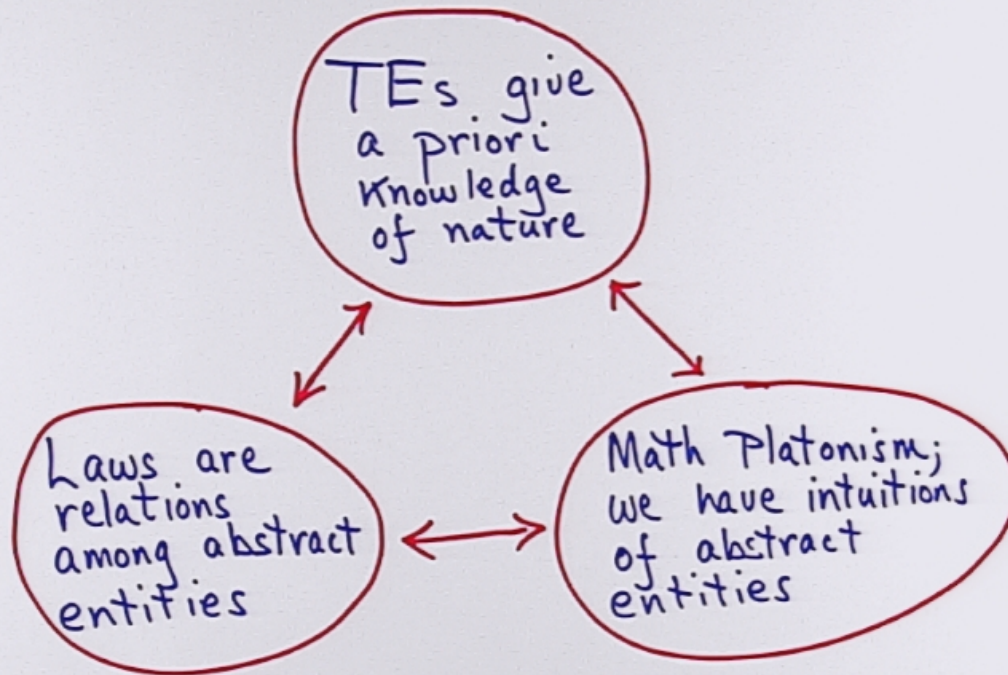
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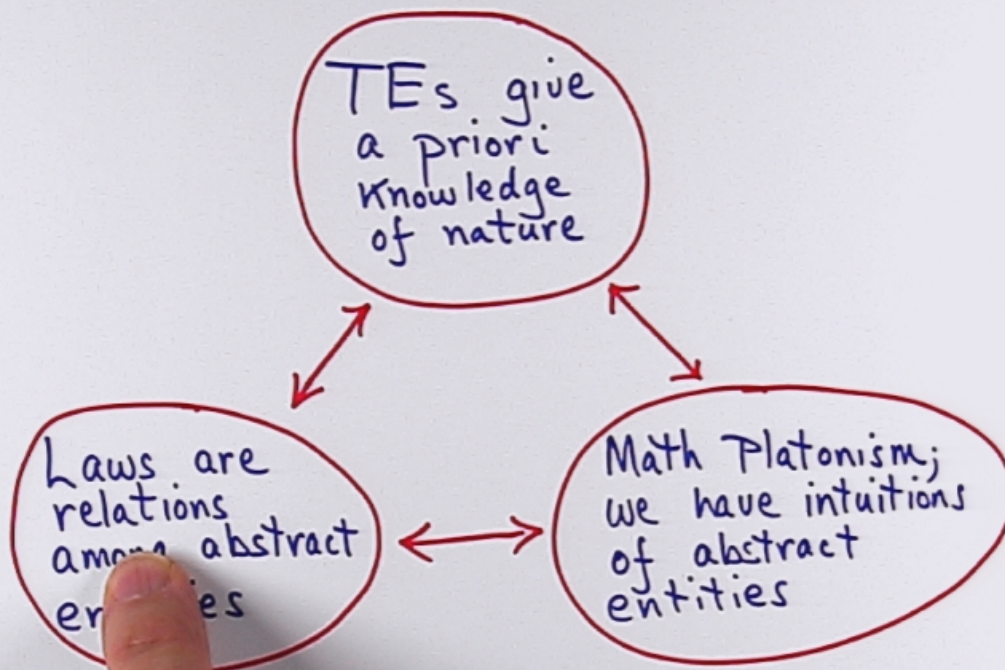


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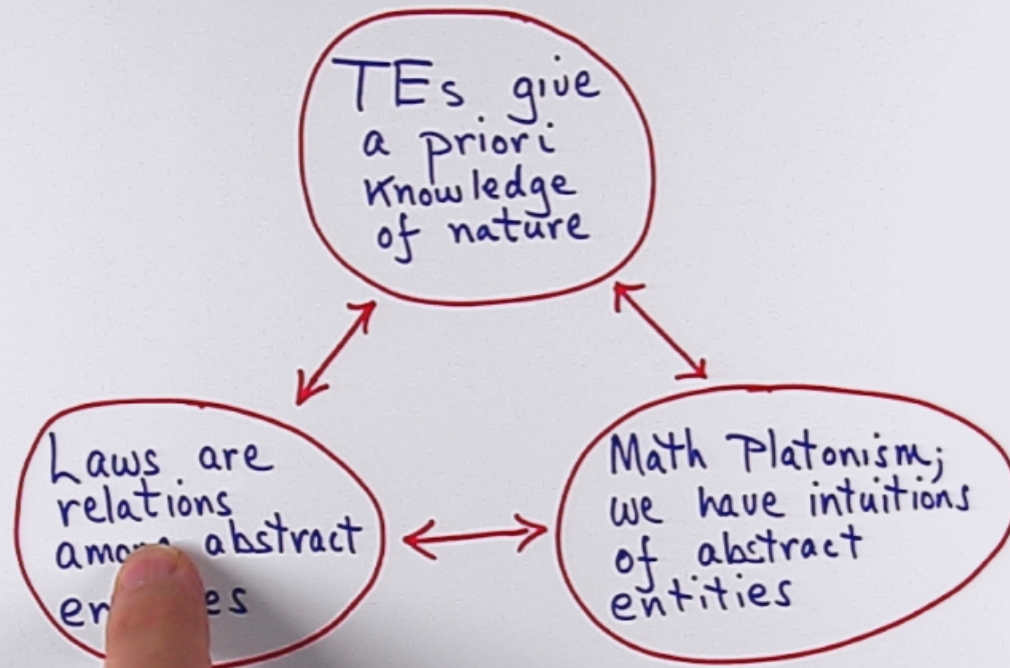




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