2.1

The Problem of Change

Is the world constantly changing, or is change an illusion?

The Epistemological Divide

How did later thinkers try to save both reason and experience?

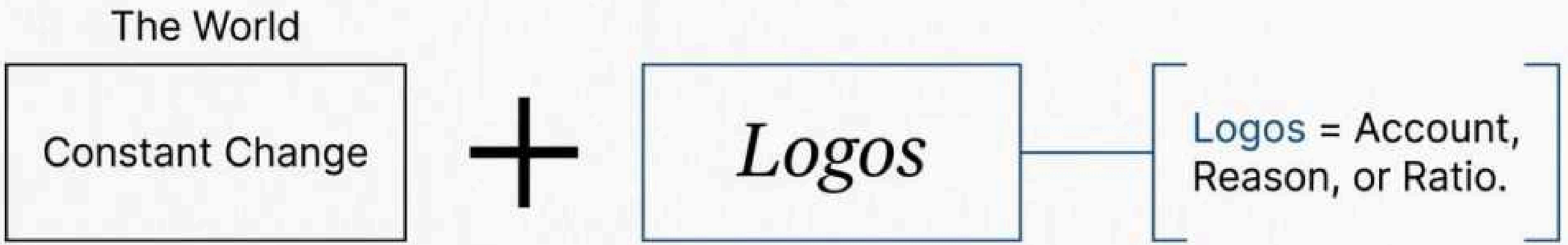
The Materialist Solution

How did the atomists arrive at the idea thtt everything is made of atoms and void?

These three puzzles shaped all later metaphysics.

Gemini Notebook

2.2

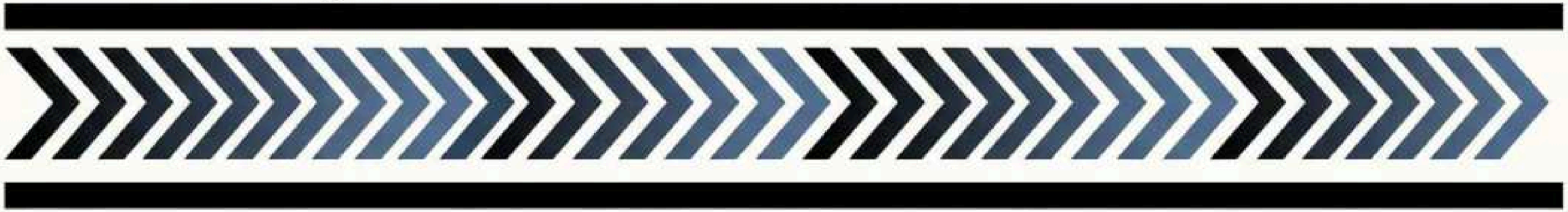


Heraclitus of Ephesus (c. 540–480 BCE) — Known in antiquity as 'The Obscure One' for writing in riddles.

Gemini Notebook

2.3

The river stays the same...



...because the water never does.

"Those who step into the same rivers find other and still other waters flowing over them."

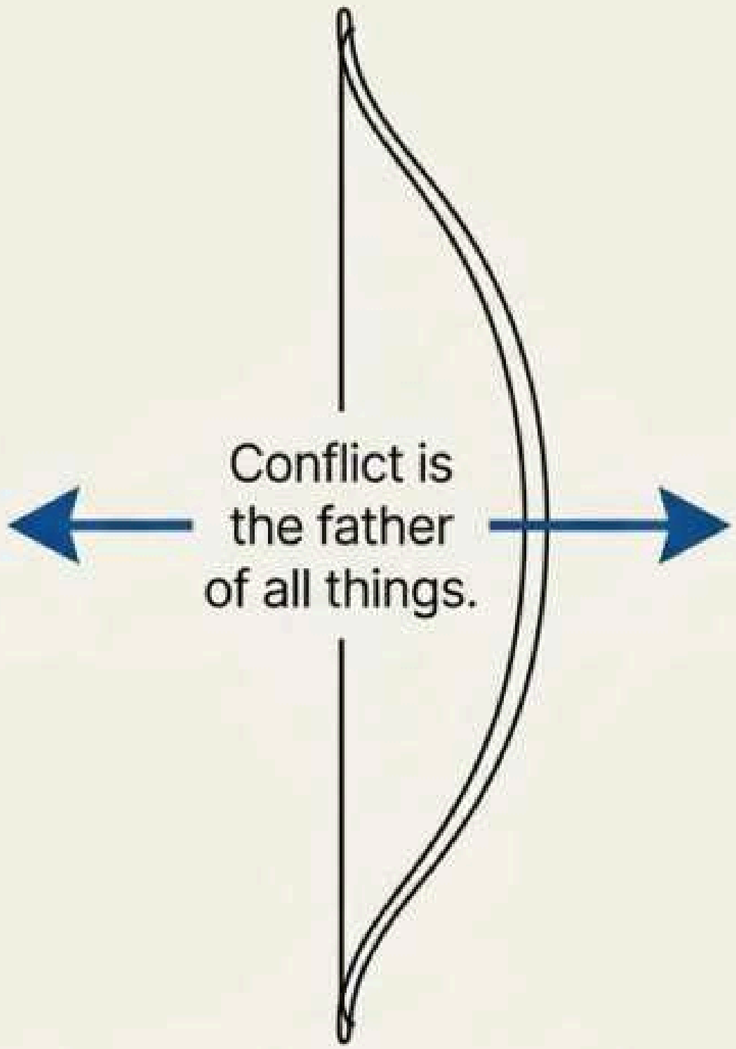
Later Slogan: Everyth Gemini Notebook

2.4

The road up
The road down ⟷ One and the same

Sickness ⟶ Makes Health pleasant

Hunger ⟶ Makes Food sweet



Sickness ⟶ Makes Health pleasant

Sickness ⟶ Makes Health pleasant

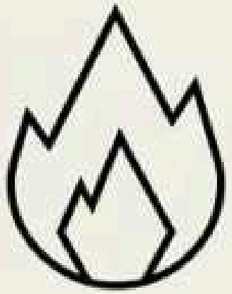
Hunger ⟶ Makes Food sweet

Tension between opposites keeps the world in balance.

Gemini Notebook

2.5

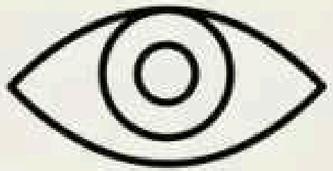
The Basic Stuff: Fire



A process more than a thing,
always burning and changing.

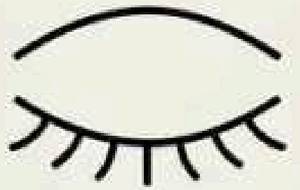
Following the Logos

Shared Reason



The Logos is common to all.
(Waking)

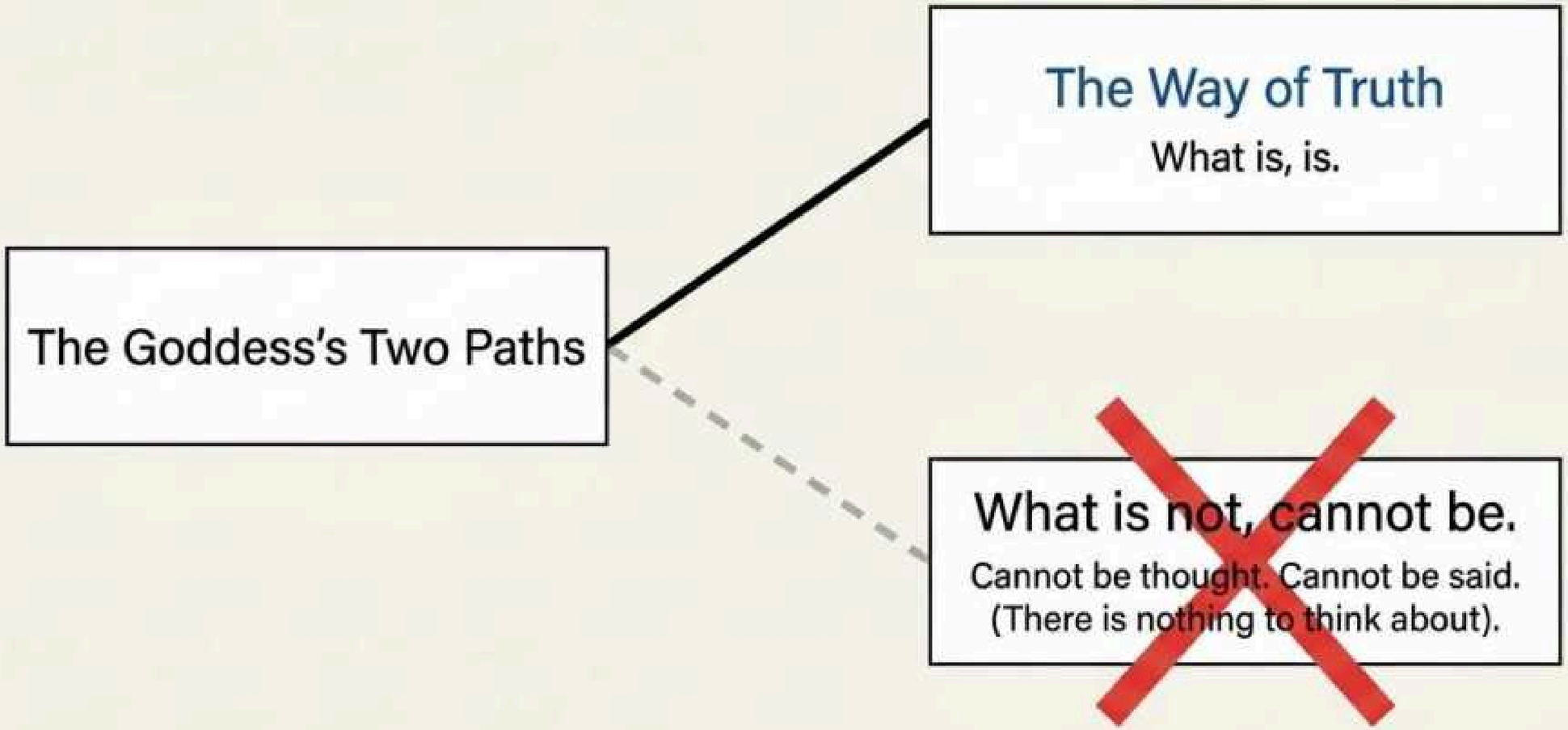
Private Understanding



Failing to listen to reason.
(Sleeping)

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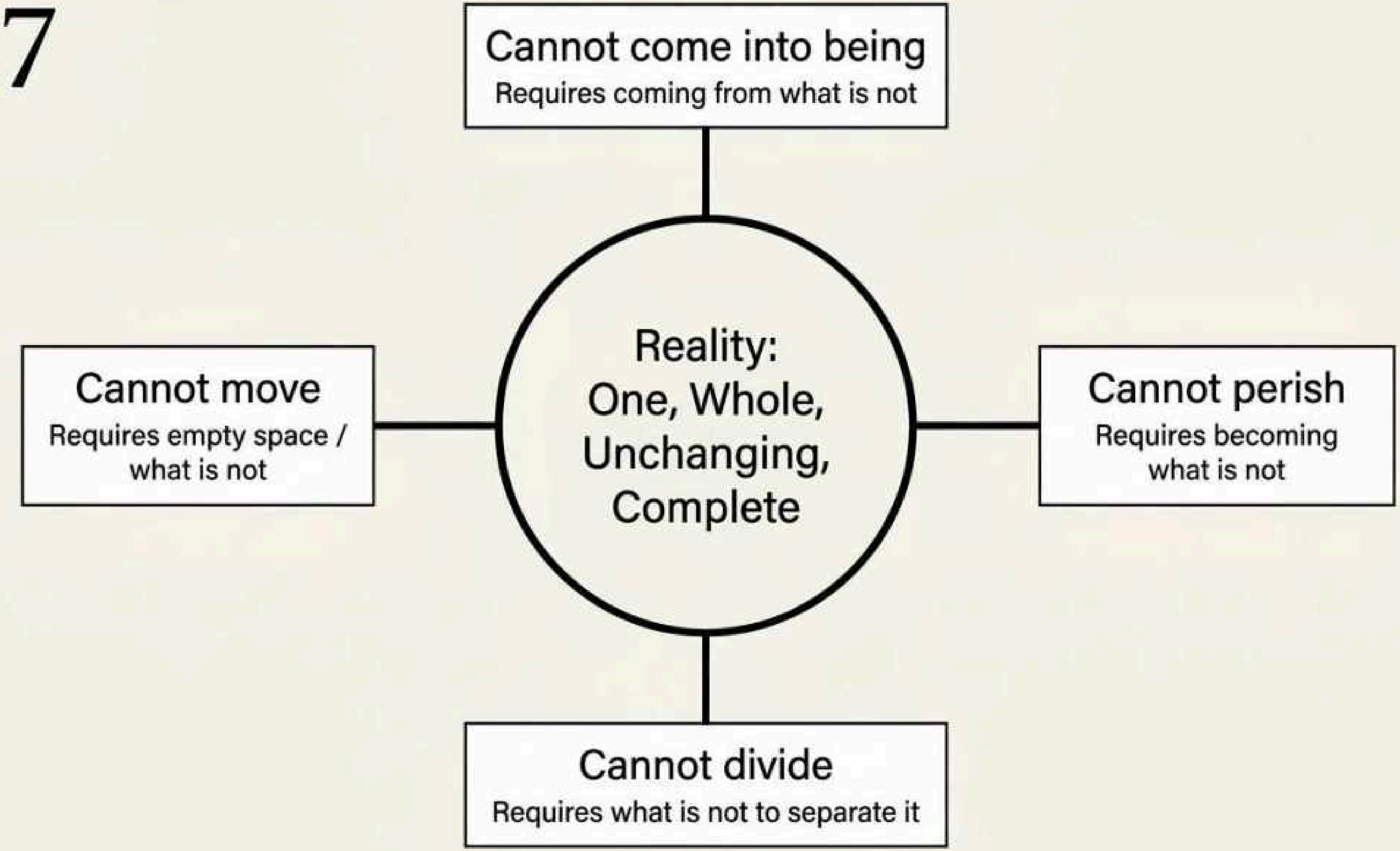
2.6



Parmenides of Elea (c. 515 BCE).

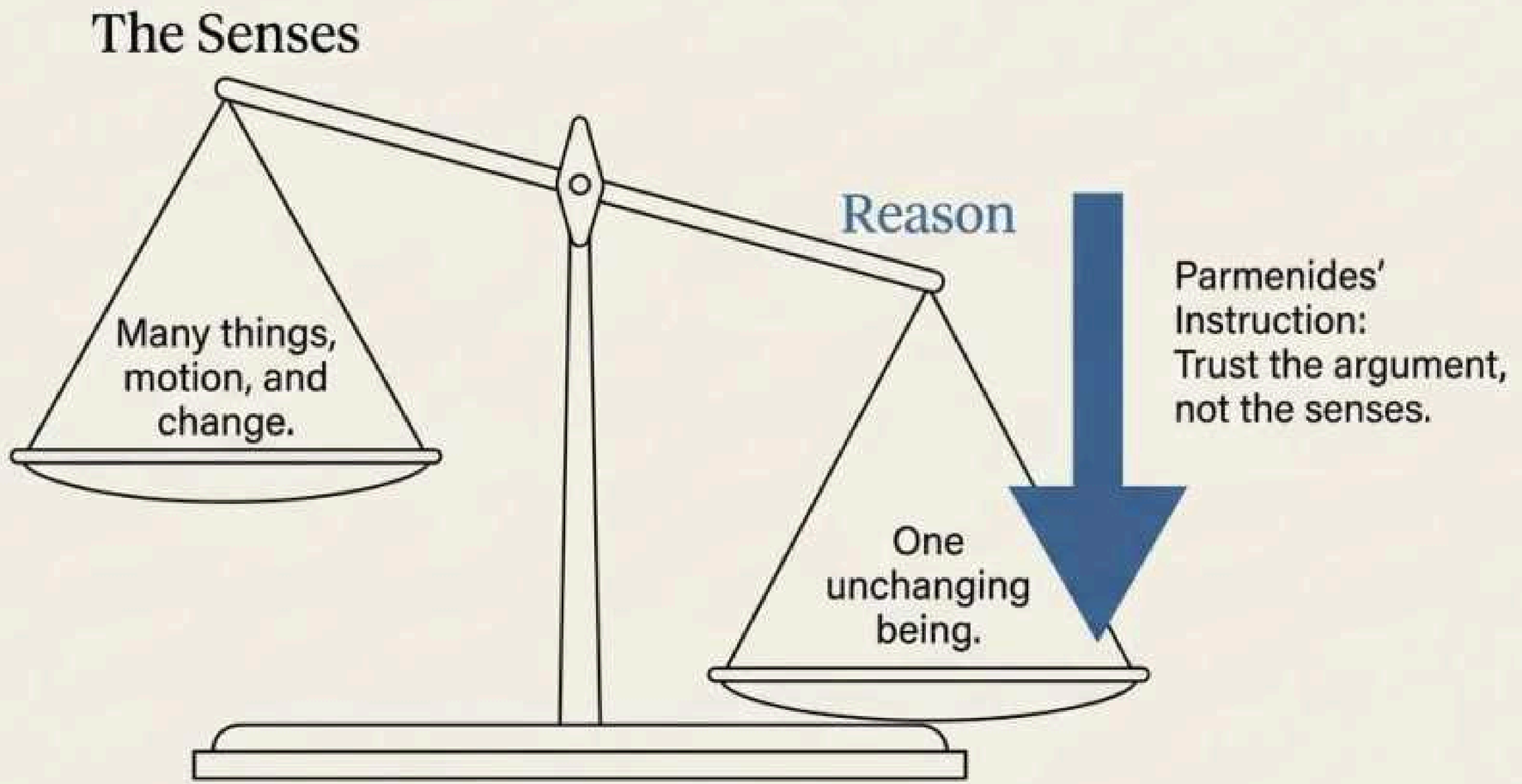
Gemini Notebook

2.7



Gemini Notebook

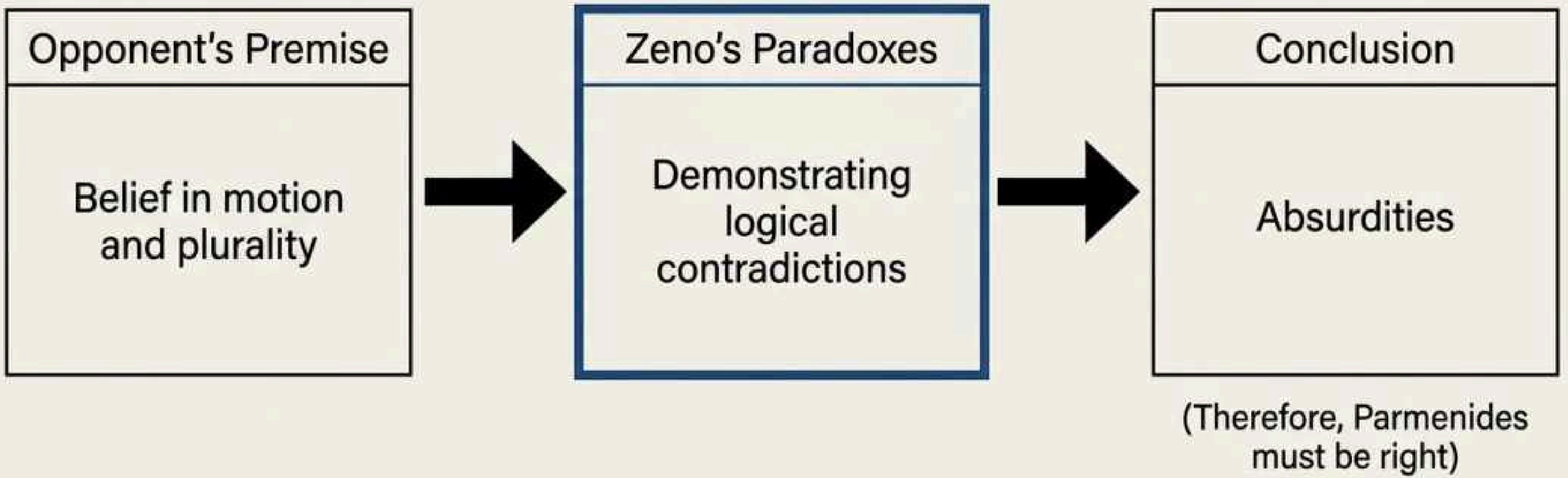
2.8



The first great clash between reason and experience.
Matters for every later theory of knowledge.

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2.9

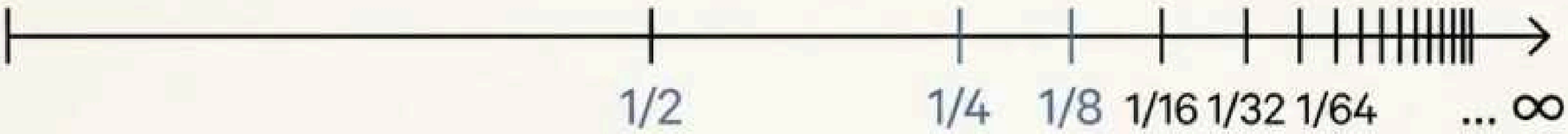


Zeno of Elea (c. 490–430 BCE). Known only through reports by Aristotle. Among the oldest puzzles in philosophy.

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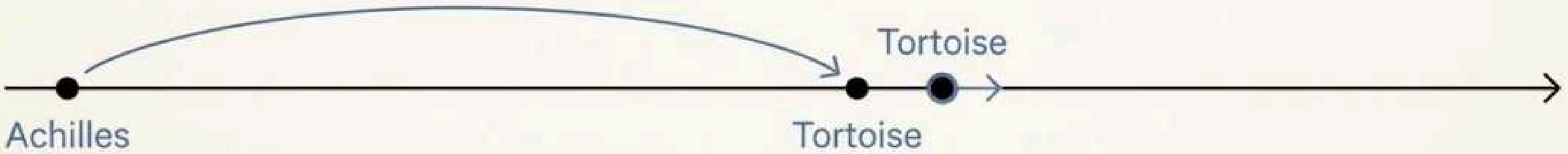
2.10

The Dichotomy Paradox



You can never finish crossing.

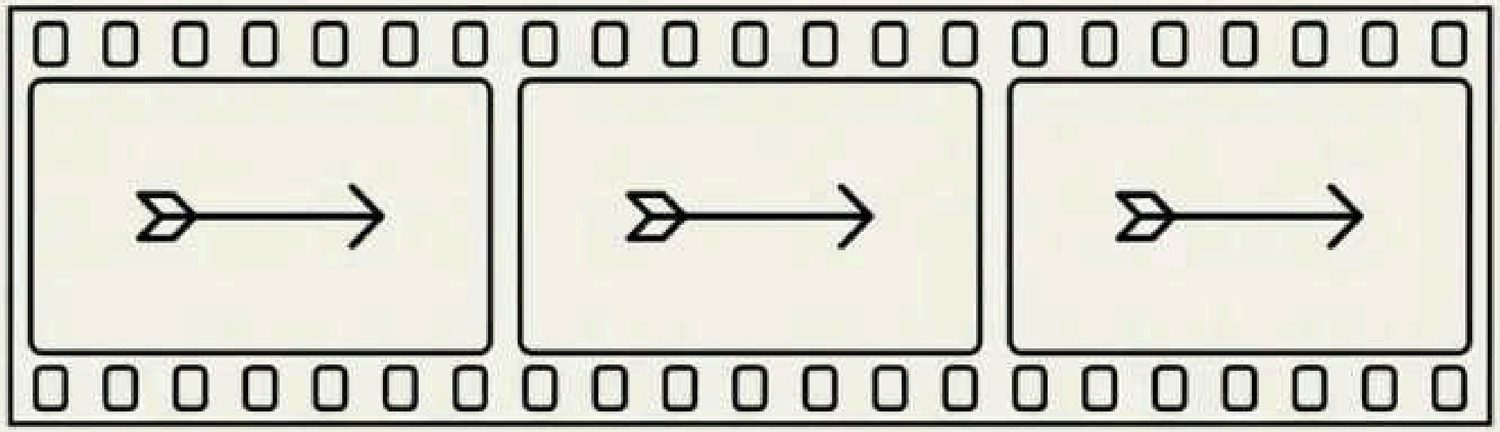
The Achilles Paradox



The fast runner must always first reach where the slow runner was.

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2.11



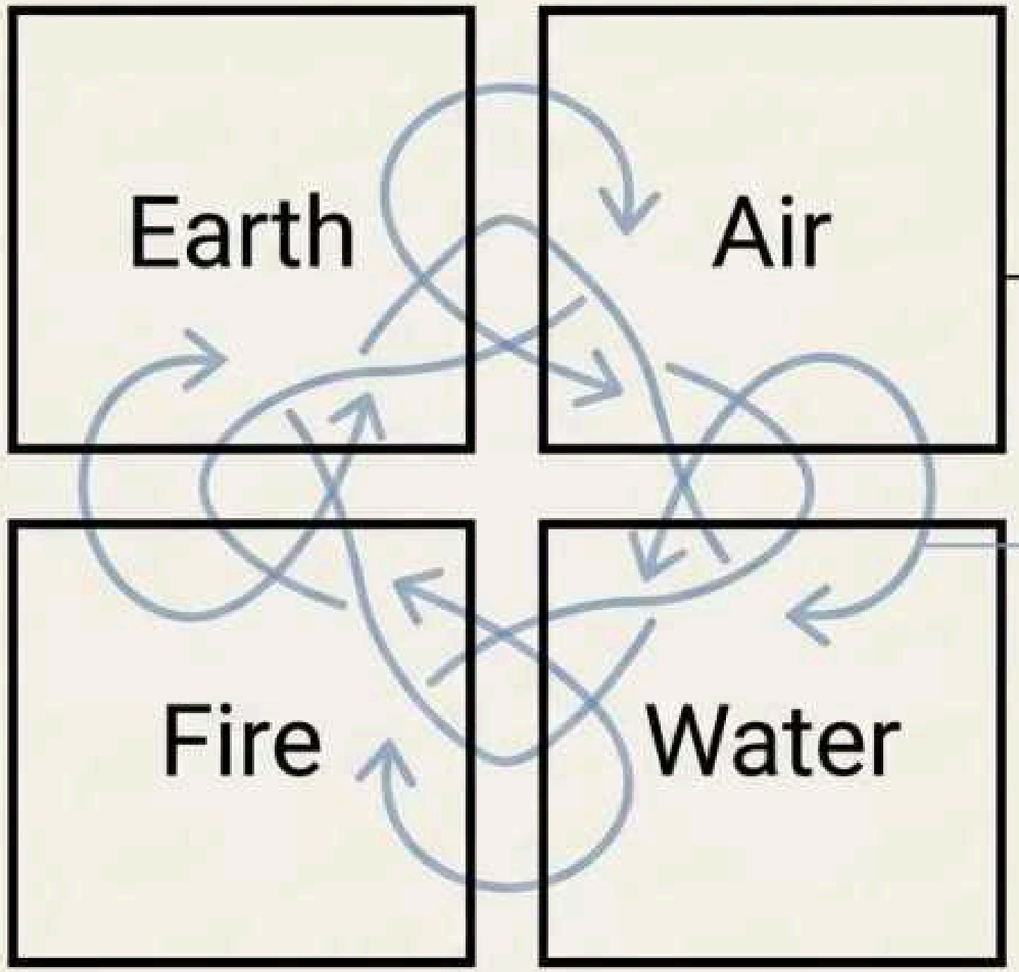
Premise 1: At any instant, an arrow occupies a space equal to itself.
Premise 2: Therefore, it is at rest at each instant.

How can a sum of rests be motion?

Modern mathematics sums such infinite series to finite totals, but philosophical debate remains alive.

Gemini Notebook

2.12



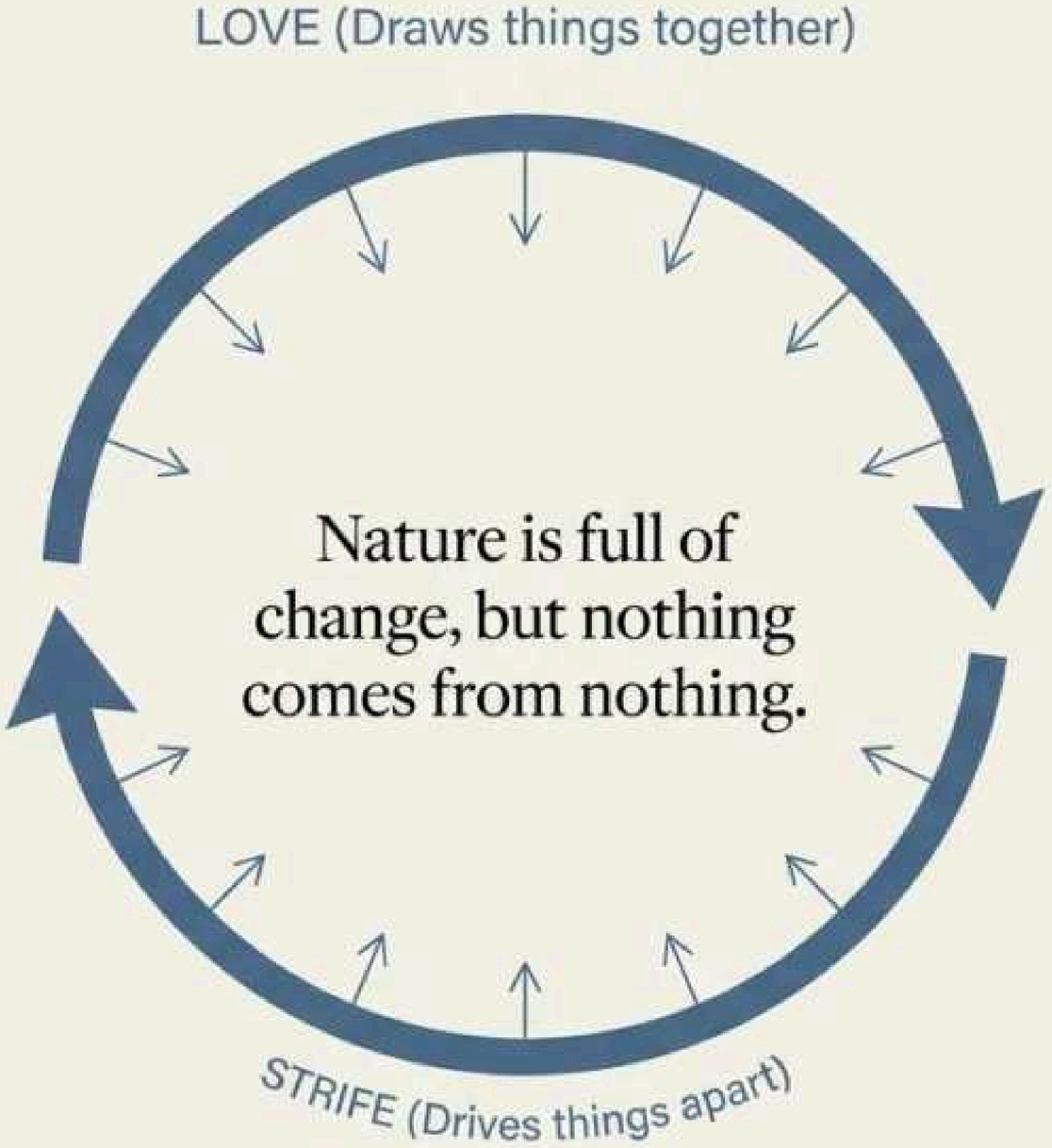
Rule 1: The roots themselves never change.

Rule 2: They mix and separate to make all things.

Empedocles of Sicily (c. 494–434 BCE). The standard picture of matter for two thousand years.

Gemini Notebook

2.13

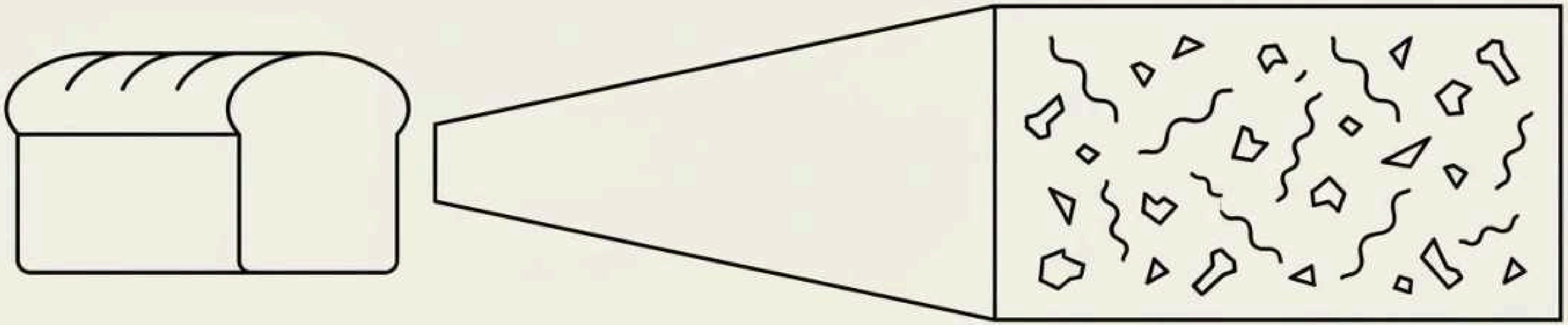


Reason is kept; the world of change is saved.

Gemini Notebook

2.14

Nous (Mind) - Sets the whole in motion and orders it. (Praised by Aristotle as a "sober new idea").



Everything contains a portion of everything.
(Bread nourishes because the parts are already there).

Anaxagoras of Clazomenae (c. 500–428 BCE).

Gemini Notebook

2.15

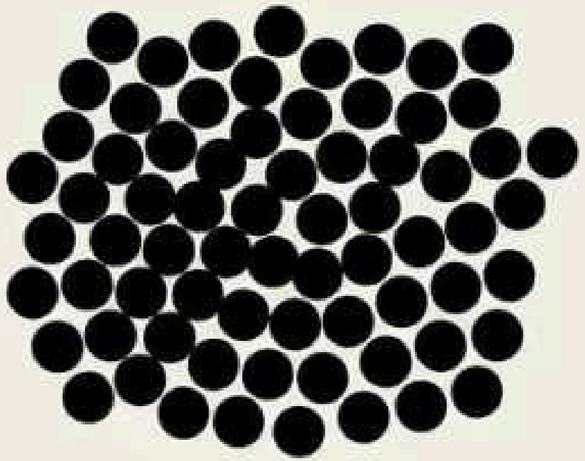
1. Scientific Claims	2. Societal Friction	3. The Consequence
Sun = A blazing rock (larger than the Peloponnese). Moon = Shines by reflected light.	Offended pious Athenians.	Charged with impiety and exiled.

An early warning of what could happen to philosophers.

Gemini Notebook

2.16

Atoms



Tiny, indivisible, eternal particles.

Void



The empty space in which atoms move.

The most lasting answer. Democritus of Abdera (c. 460–370 BCE).

Gemini Notebook

2.17

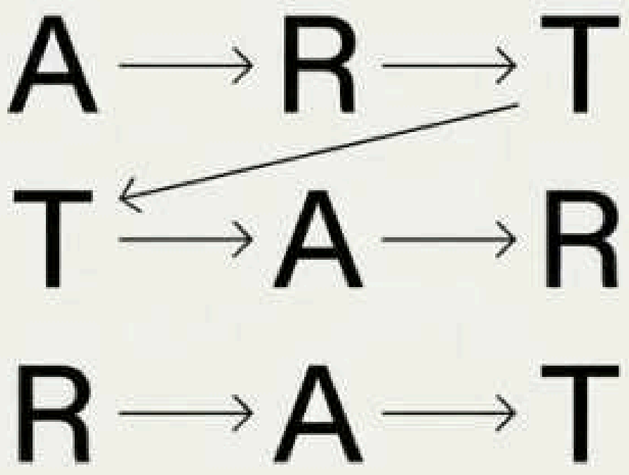
The Clever Answer	
Parmenides' Rules	The Atomist Hack
What is not cannot exist (No void, no motion).	Void exists as empty space, allowing motion.
Being is solid, uncreated, and unchanging.	Atoms are Parmenidean Being: solid, uncreated, and unchanging.

→

Motion and change are saved without violating the logic of Being.

Gemini Notebook

2.18



Letters make different words.
Atoms (differing in shape, arrangement, and position) make different perceptions.

Convention Sweet, Bitter, Hot, Cold.
(Our senses give us a dim and misleading picture.)

Reality Atoms and Void.
(The only objective reality.)

Gemini Notebook

2.19

Physics & Cosmology (Materialism)

- No purpose or designer.
- Infinite worlds form and dissolve in the infinite void.

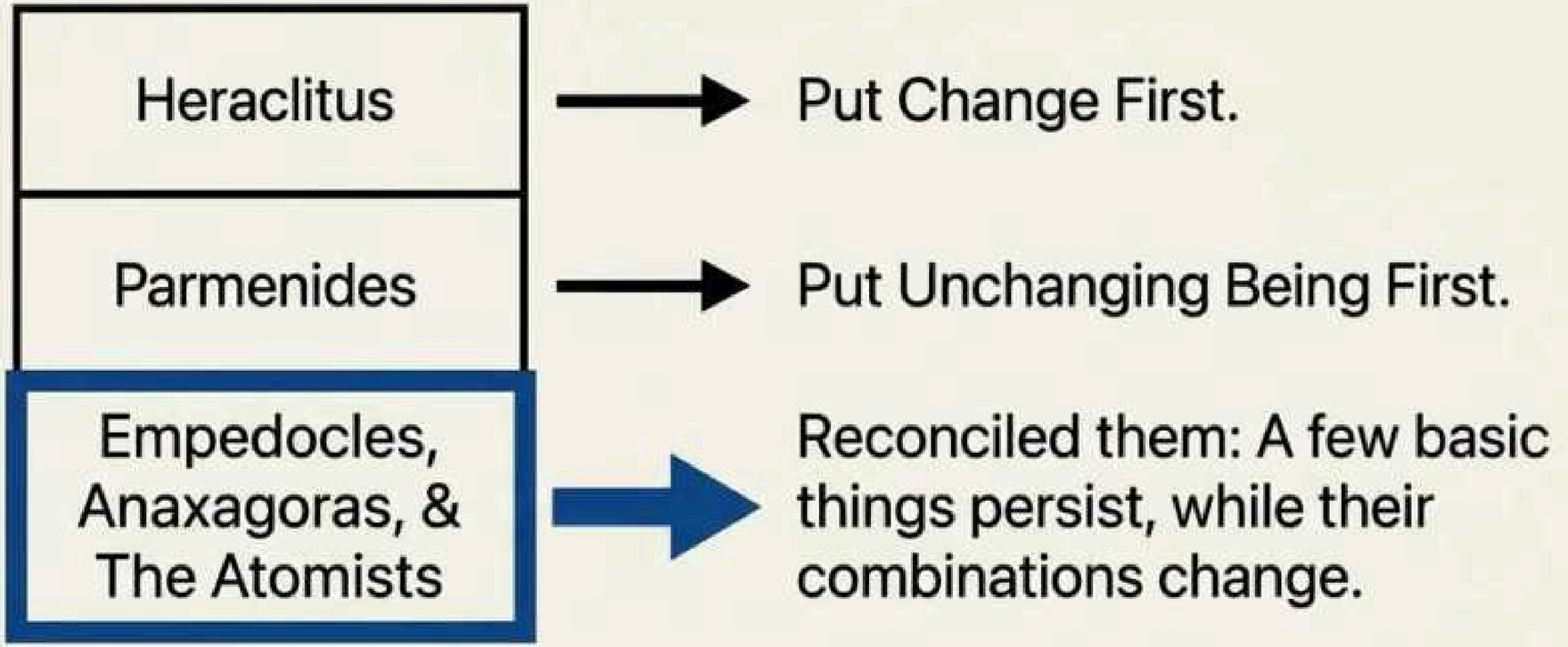
Ethics (The Good Life)

- Recommendation of cheerfulness.
- Practice of moderation.

Note: Most of Democritus's writings are lost; known chiefly through later reports.

Gemini Notebook

2.20



The root of all later physics and chemistry.

Gemini Notebook

2.21

Exercise: A wooden table is burned. What stays the same, and what changes?

Empedocles' Account	Democritus' Account

Which account is closer to a modern explanation?



Lecture 3: Turning from nature to human life, and to the city of Athens.

Gemini Notebook