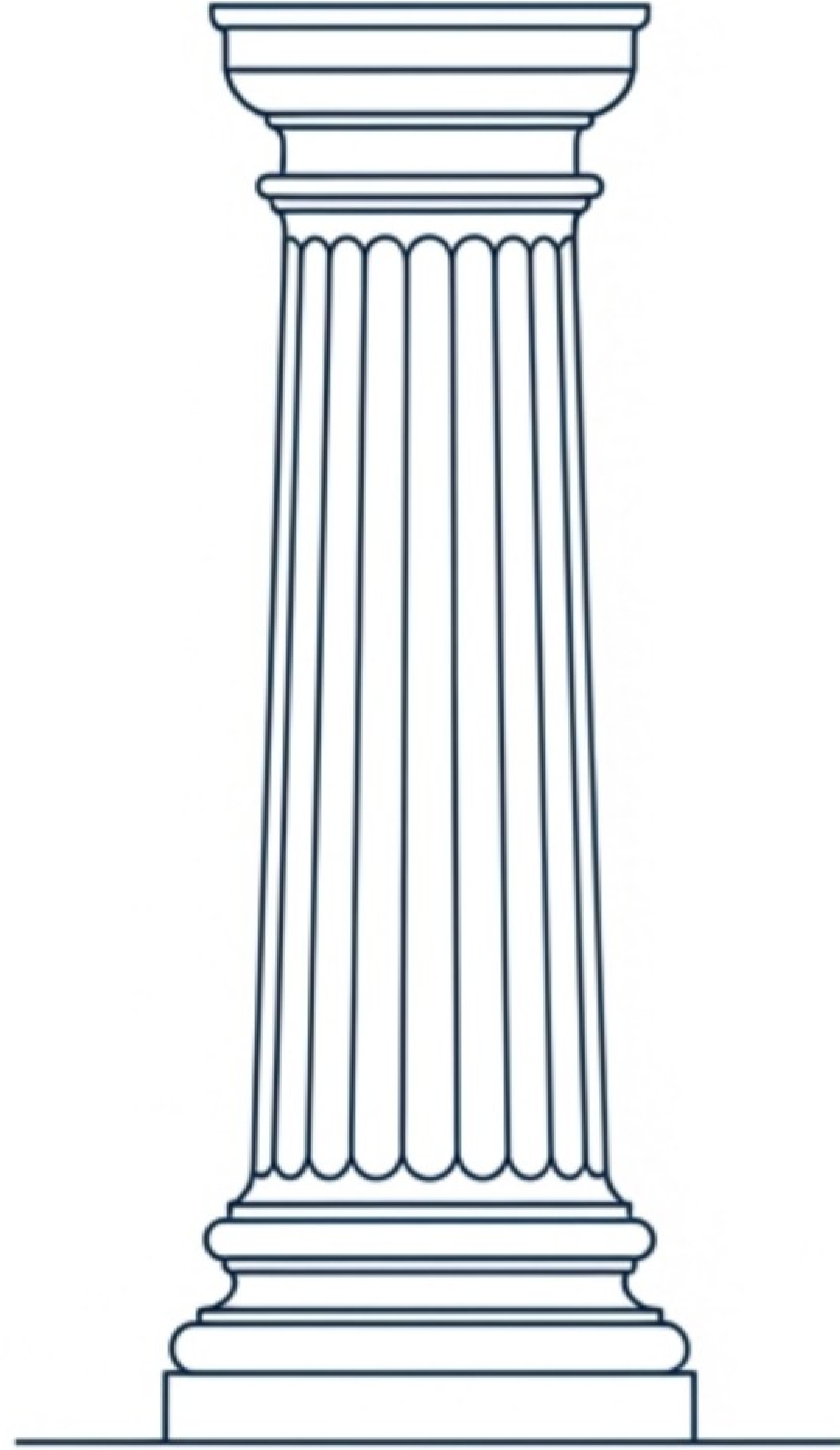


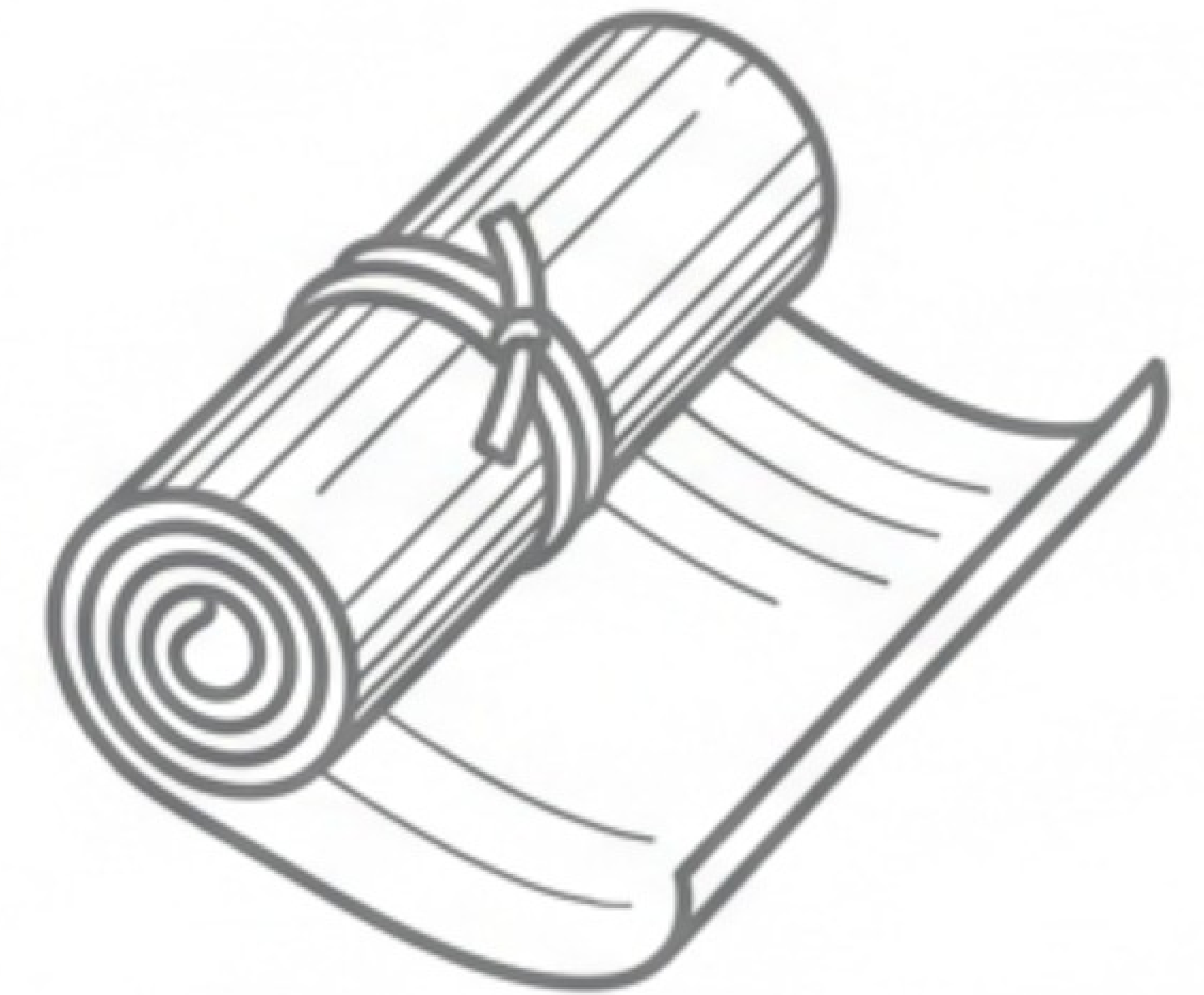
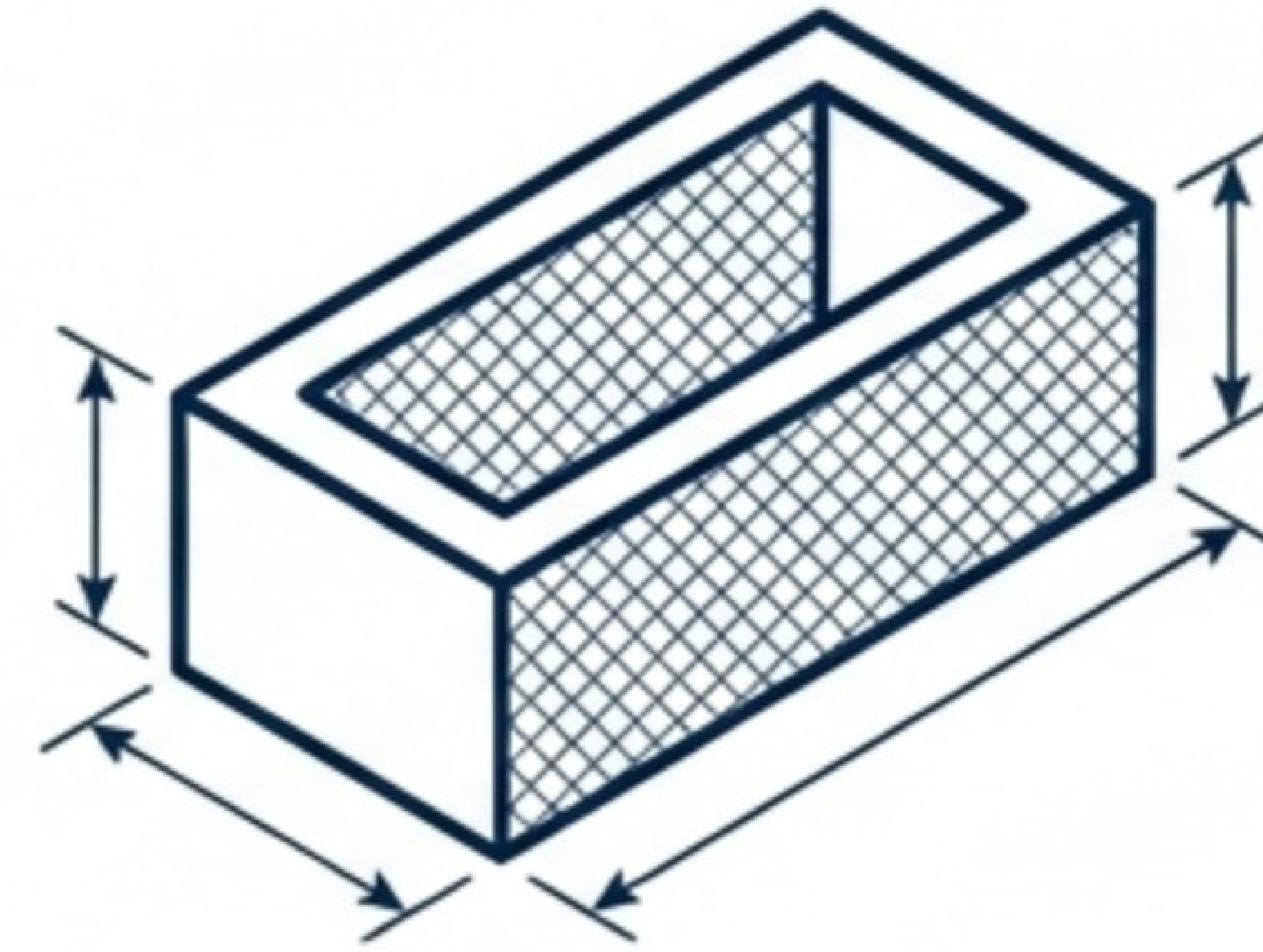
The Architecture of Logic



A Structural Guide to Statements, Arguments, and Reasoning

The Fundamental Unit: The Statement

- **Definition:** A declarative sentence that possesses a specific Truth Value.
- **The Binary Rule:** Information must be definitively True or False.
- **Synonym:** Also formally known as a Proposition.
- **Example:** “I went to the market yesterday.” (Verifiable fact).



The smallest building block of logical thought.

Sentences vs. Statements

If it lacks Truth Value, it is NOT a logical statement.

Interrogative

Questions asking for info.

Example: "Did I go to the market?"



Imperative

Commands or Orders.

Example: "Bring me a glass of water."



Exclamatory

Commands or Orders.

Example: "Bring me a glass of water."



Exclamatory

Emotional outbursts.

Example: "Wow!"



The Construction: Defining the Argument

Definition: A structure used to prove a point or establish a conclusion based on evidence.

Anatomy:

- **Premise (P):** Existing information or known facts (The Evidence).
- **Conclusion (C):** New information derived from the Premise (The Result).



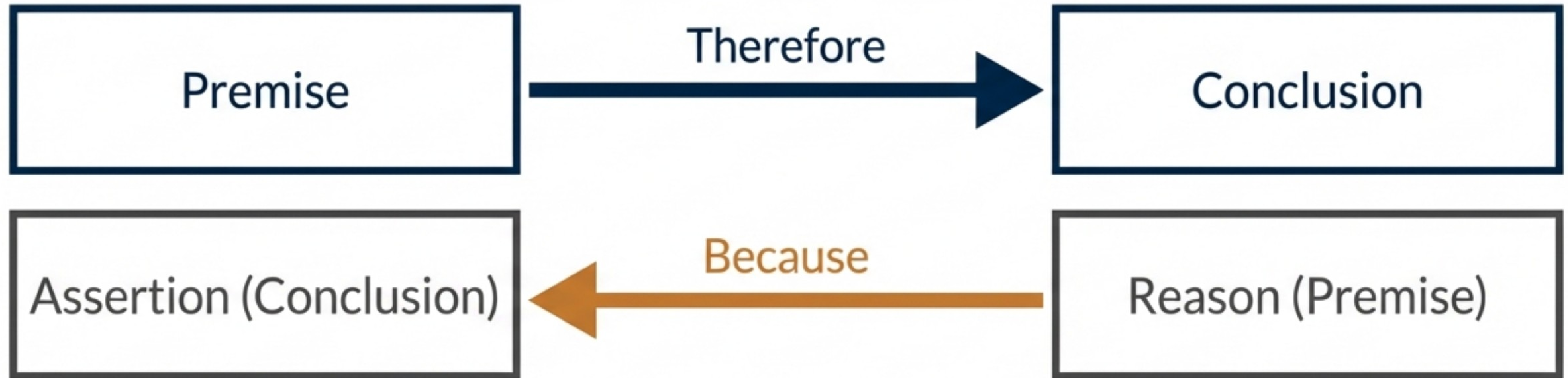
Premise + Premise = Conclusion

Structural Markers: The 'Therefore' Rule



Example: The sun emits UV rays (P) + Sunscreen blocks UV rays
(P) → **Therefore**, wear sunscreen (C).

Inverting the Structure: Assertion & Reason



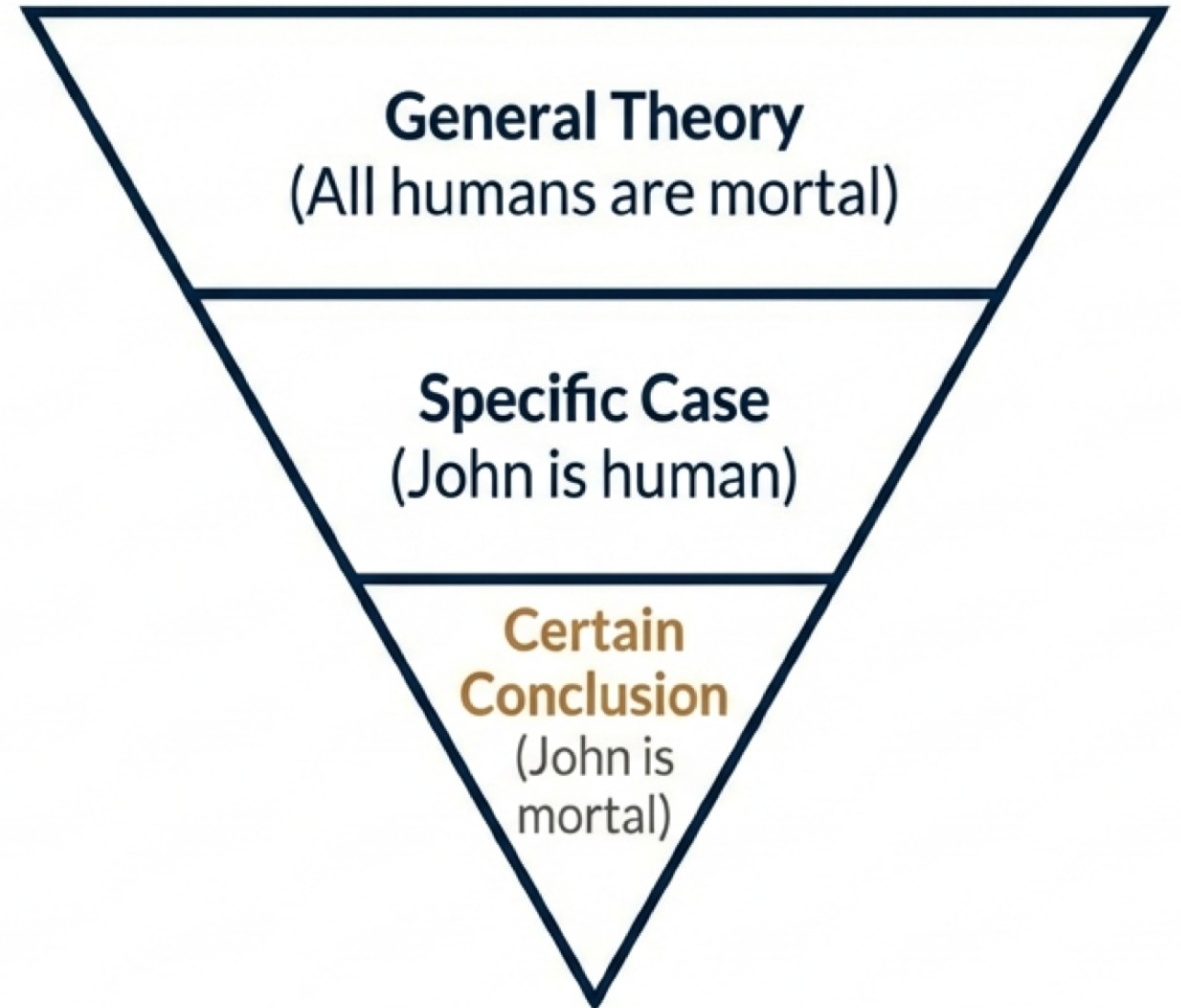
Assertion (A) = The Claim.

Reason (R) = The Evidence.

The Logic: **[Assertion]** occurs **BECAUSE** **[Reason]**.

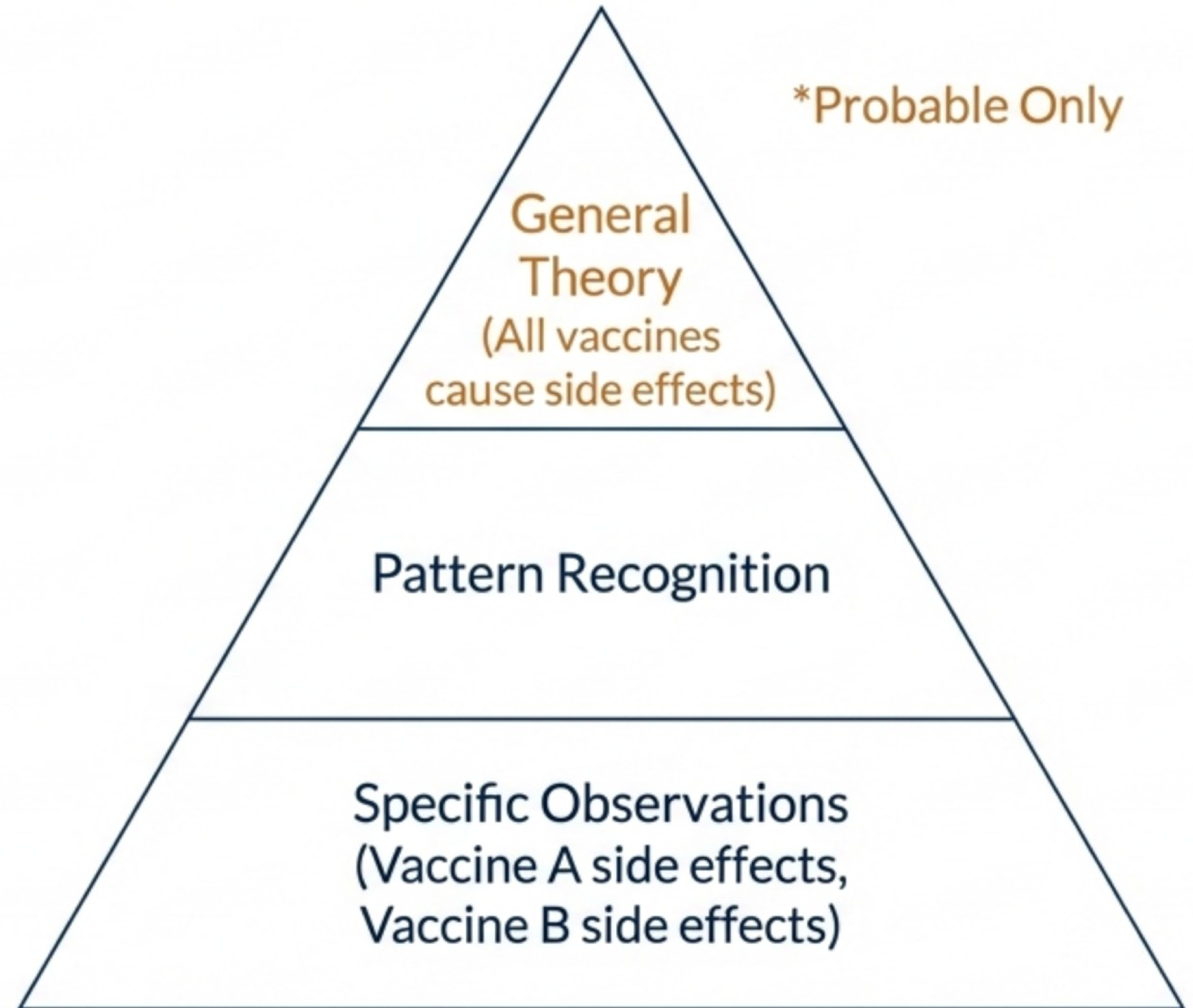
Deductive Reasoning: The Top-Down Approach

- **Direction:** General → Specific.
- **Nature:** Absolute Certainty (100% True).
- **Process:** Applying a universal theory to a specific case.



Inductive Reasoning: The Bottom-Up Approach

- **Direction:** Specific → General.
- **Nature:** Probabilistic (Likely, but not guaranteed).
- **Process:** Observation → Pattern → General Theory.



Abductive & Analogical Reasoning

Abductive Reasoning

- Goal: Inference to the Best Possible Explanation

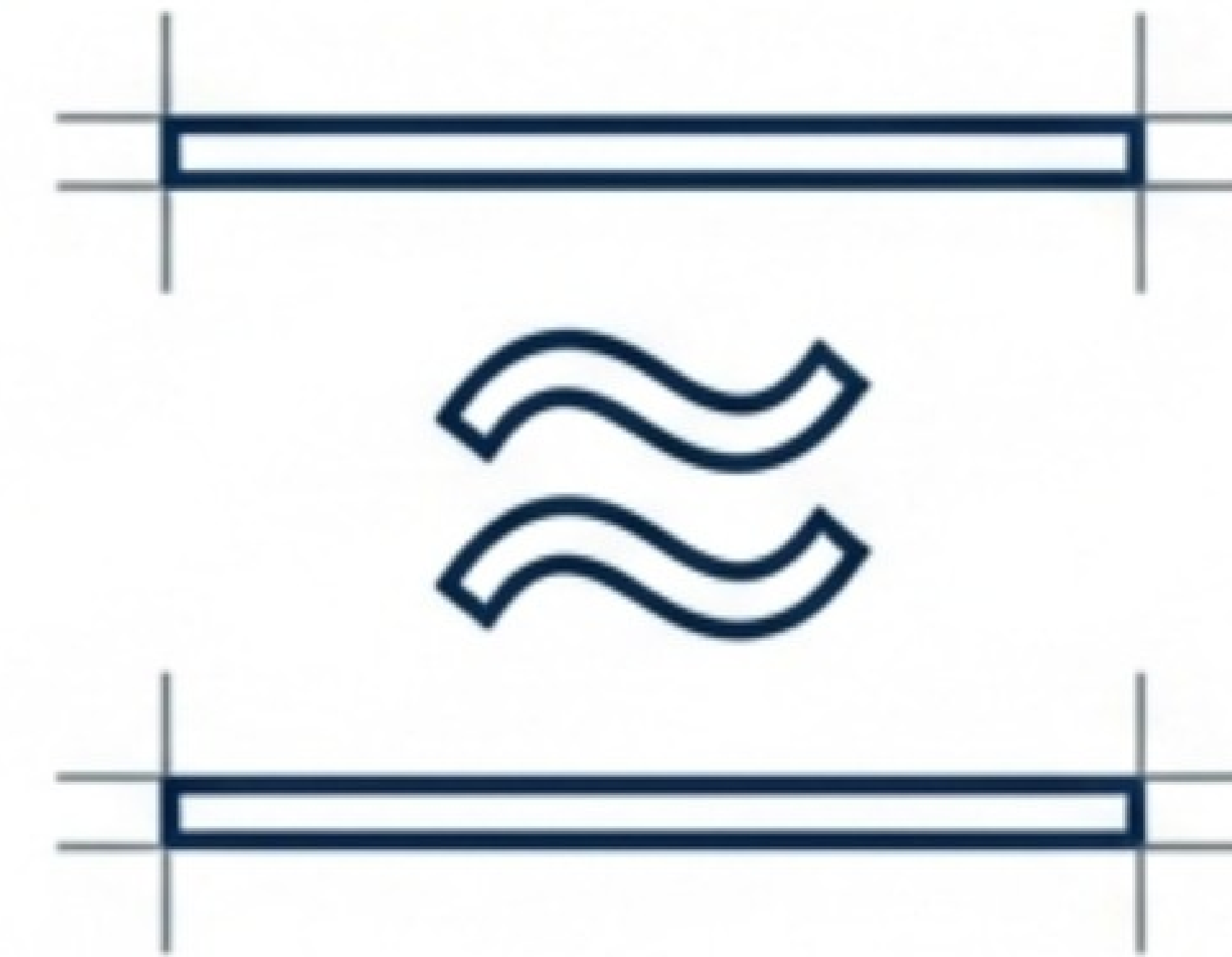


Observation: Wet grass.
Known Fact: Rain makes grass wet.

Conclusion: It probably rained.

Analogical Reasoning

- Goal: Comparison based on similarity



“Finding a partner is like finding a needle in a haystack.”

Is like
Similar to

Deductive Evaluation: Validity

Structure vs. Reality

Definition: Validity relates strictly to the STRUCTURE. If the structure is correct, the conclusion follows the premises—regardless of truth.

Blueprint	The Valid Structure Test
P1: All cats can fly. (False Fact) P2: Snowy is a cat. C: Therefore, Snowy can fly.	

Logic holds, even if facts are false.

Deductive Evaluation: Soundness

The Gold Standard: Structure + Truth



The Unsound Trap

Unsound = Invalid Structure.

Unsound = Valid Structure + False Premises.

The Validity Truth Matrix

	Premises	Conclusion	
Scenario 1	False	True	→ Possible in Valid Argument
Scenario 2	False	False	→ Possible in Valid Argument
Scenario 3	True	True	→ Possible in Valid Argument
Scenario 4 (IMPOSSIBLE)	True	False	→ IMPOSSIBLE in Valid Argument 

A Valid argument CANNOT have True Premises and a False Conclusion.

Inductive Evaluation: Strength & Cogency

Strength (Probability)

Strong: High probability (50%+) of truth.

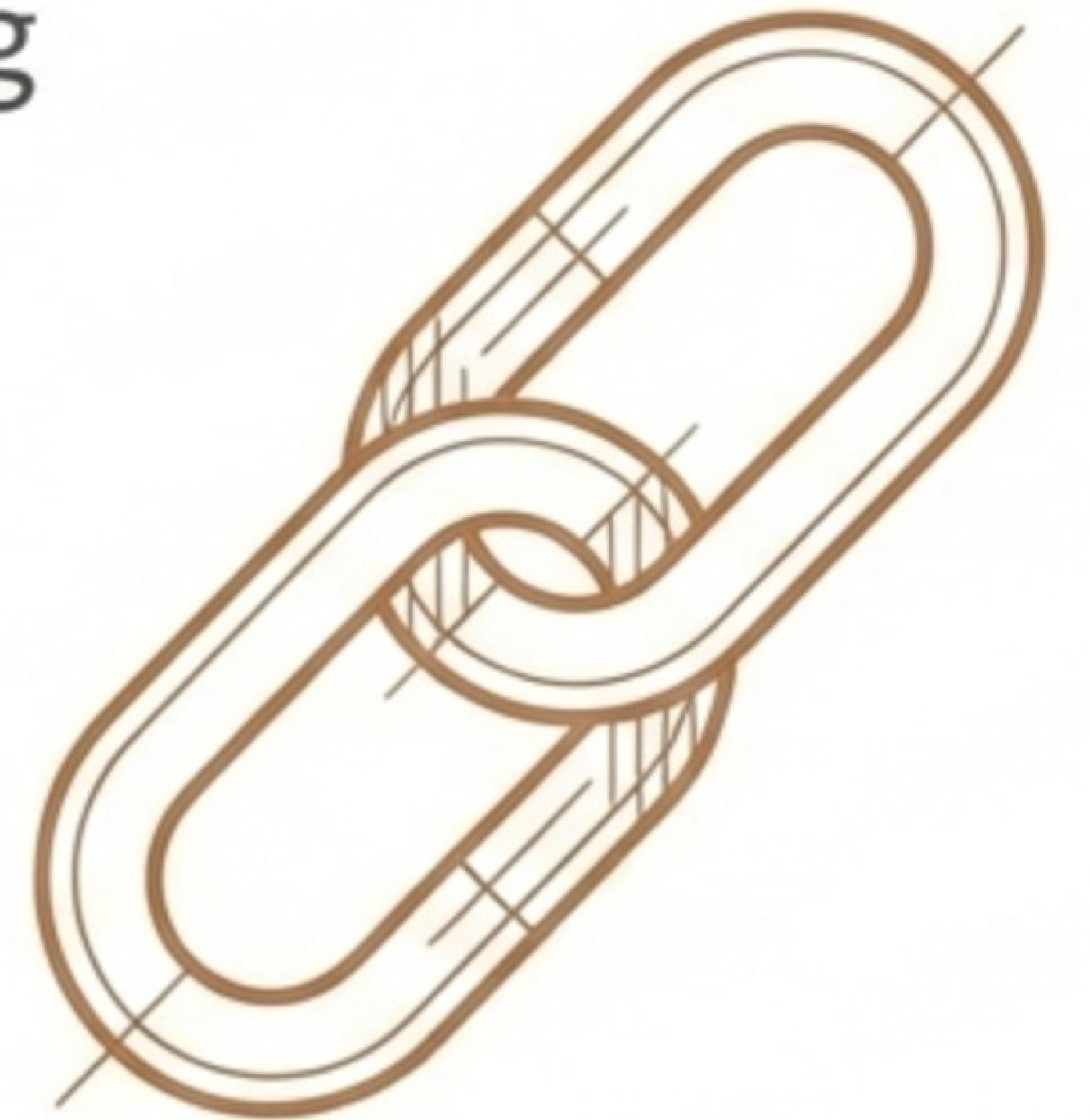
Weak: Low probability; jumps to conclusions.



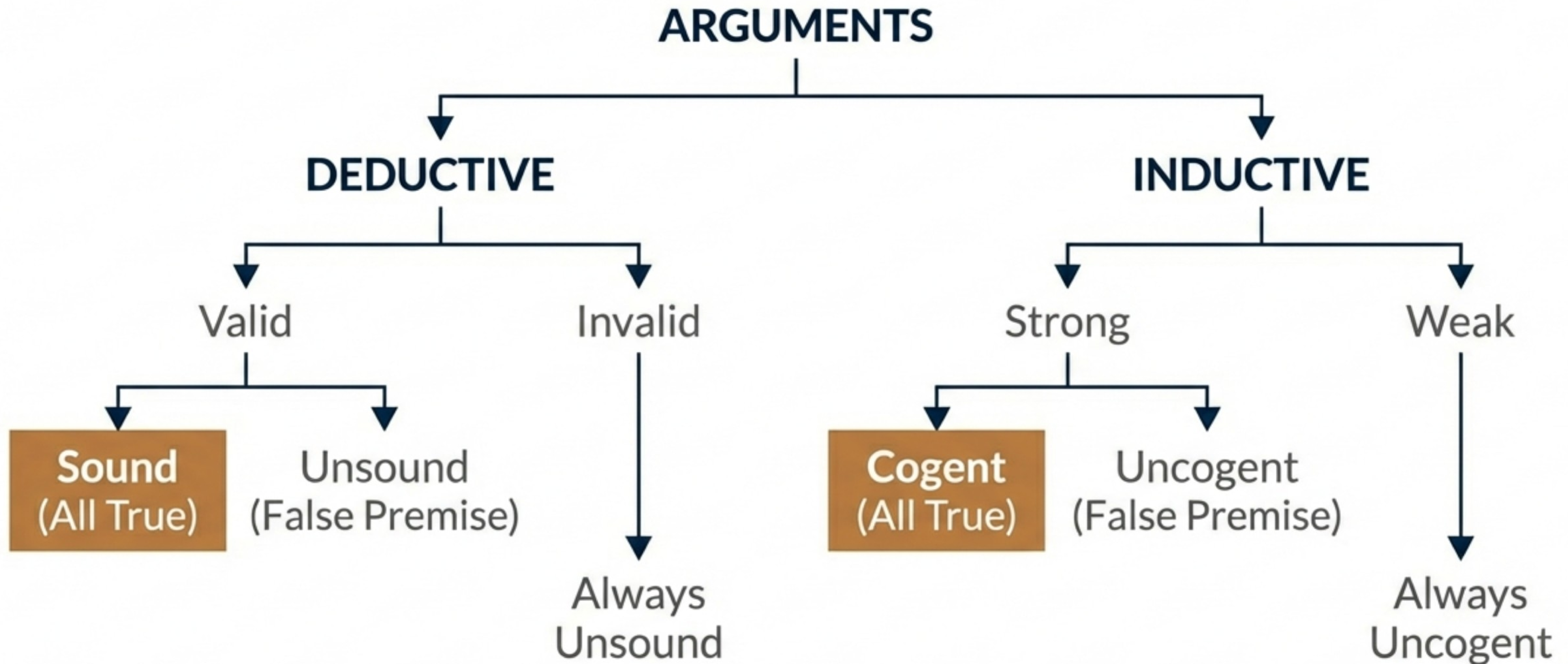
Cogency (Truth)

✓ **Cogent** = Strong Argument + **True Premises.**

Uncogent = Weak Argument **OR** **False Premises.**

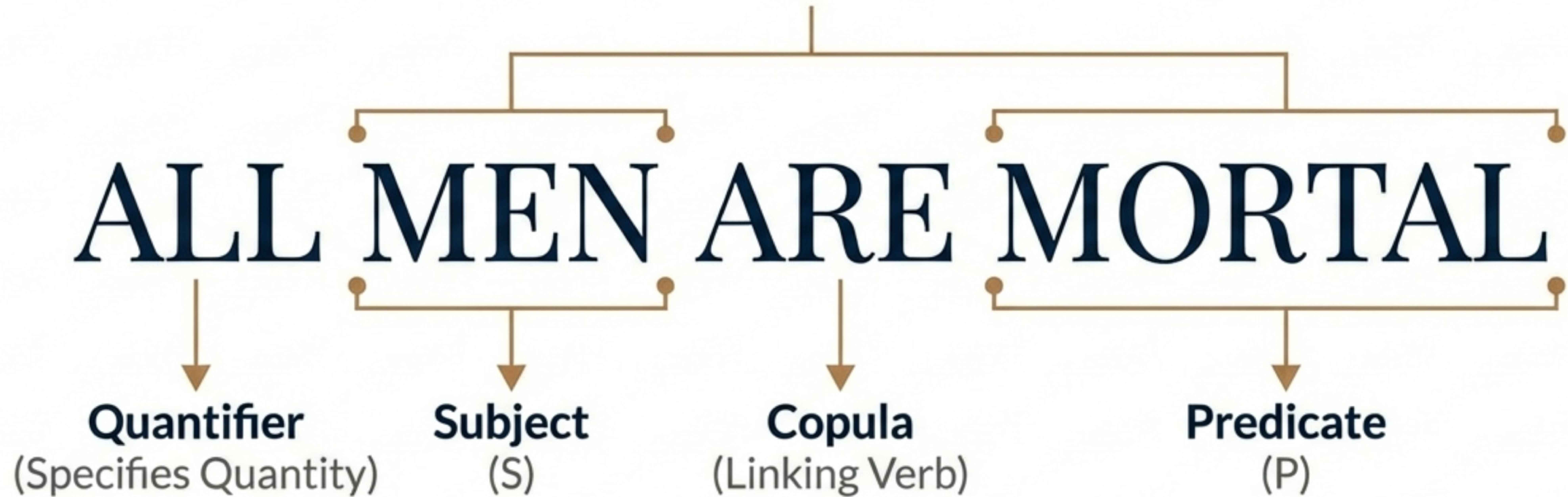


The Logic Evaluation Hierarchy



Categorical Propositions

The Standardized Language of Logic



Definition: Standardized statements relating two classes (Subject & Predicate).

The Four Standard Propositions (A, E, I, O)

A

Universal Positive

All S are P

E

Universal Negative

No S is P

I

Particular Positive

Some S are P

O

Particular Negative

Some S are not P

Classifying Propositions: Quality & Quantity

Y-Axis Quantity (How many?)	Quality (Positive/Negative?)	
	Affirmative (Are)	Negative (Are not, No)
Universal (All, No)	Universal + Affirmative = A (All S are P)	Universal + Negative = E (No S is P)
Particular (Some)	Particular + Affirmative = I (Some S are P)	Particular + Negative = O (Some S are not P)

“All men are good” = Universal Quantity + Affirmative Quality.

Introduction to Syllogism

Definition: A specific Deductive Argument structure using Categorical Propositions.

Goal: To determine if the Conclusion is Valid based **ONLY** on the Premises.

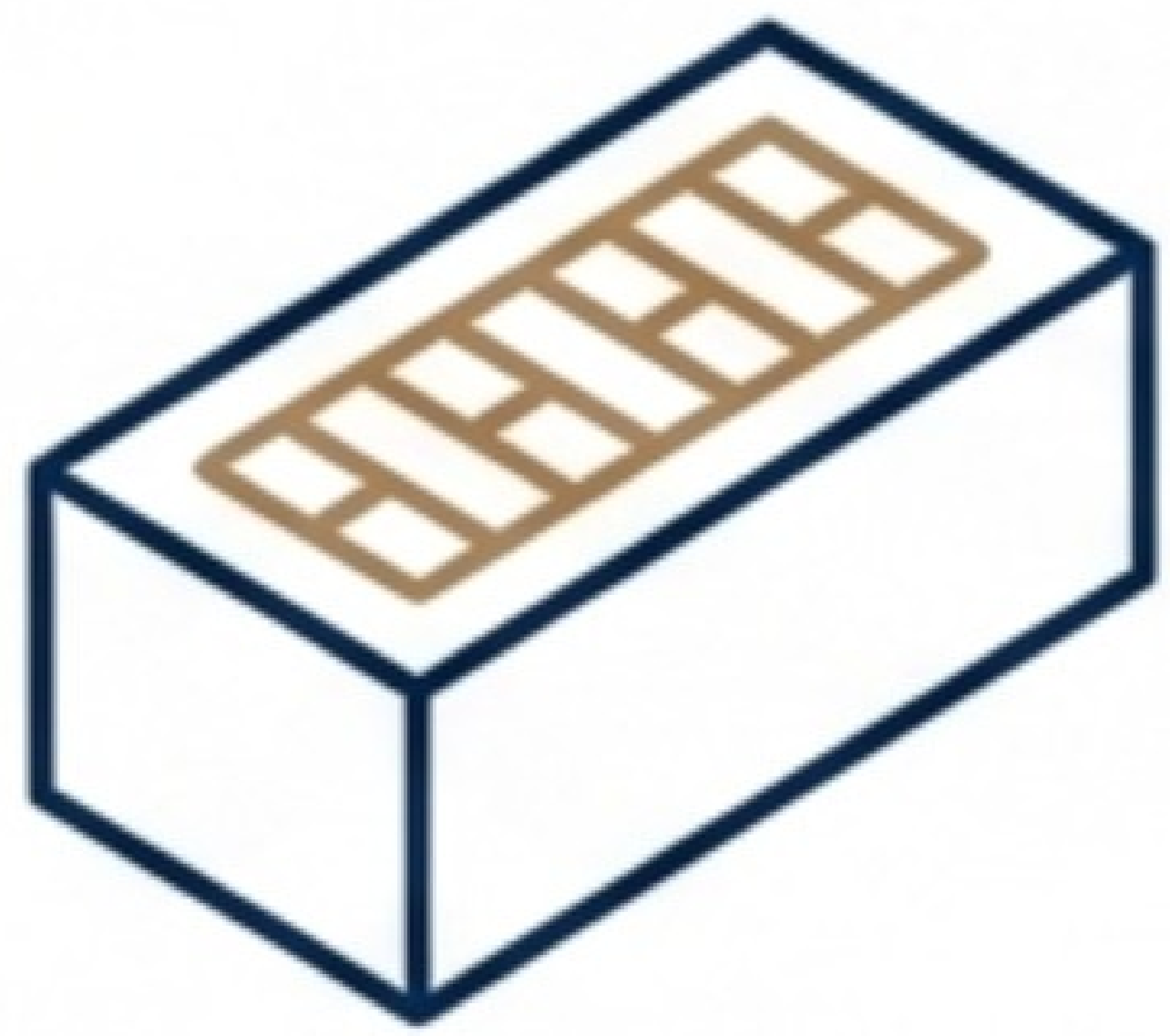
Premise 1 (Major Premise)

Premise 2 (Minor Premise)

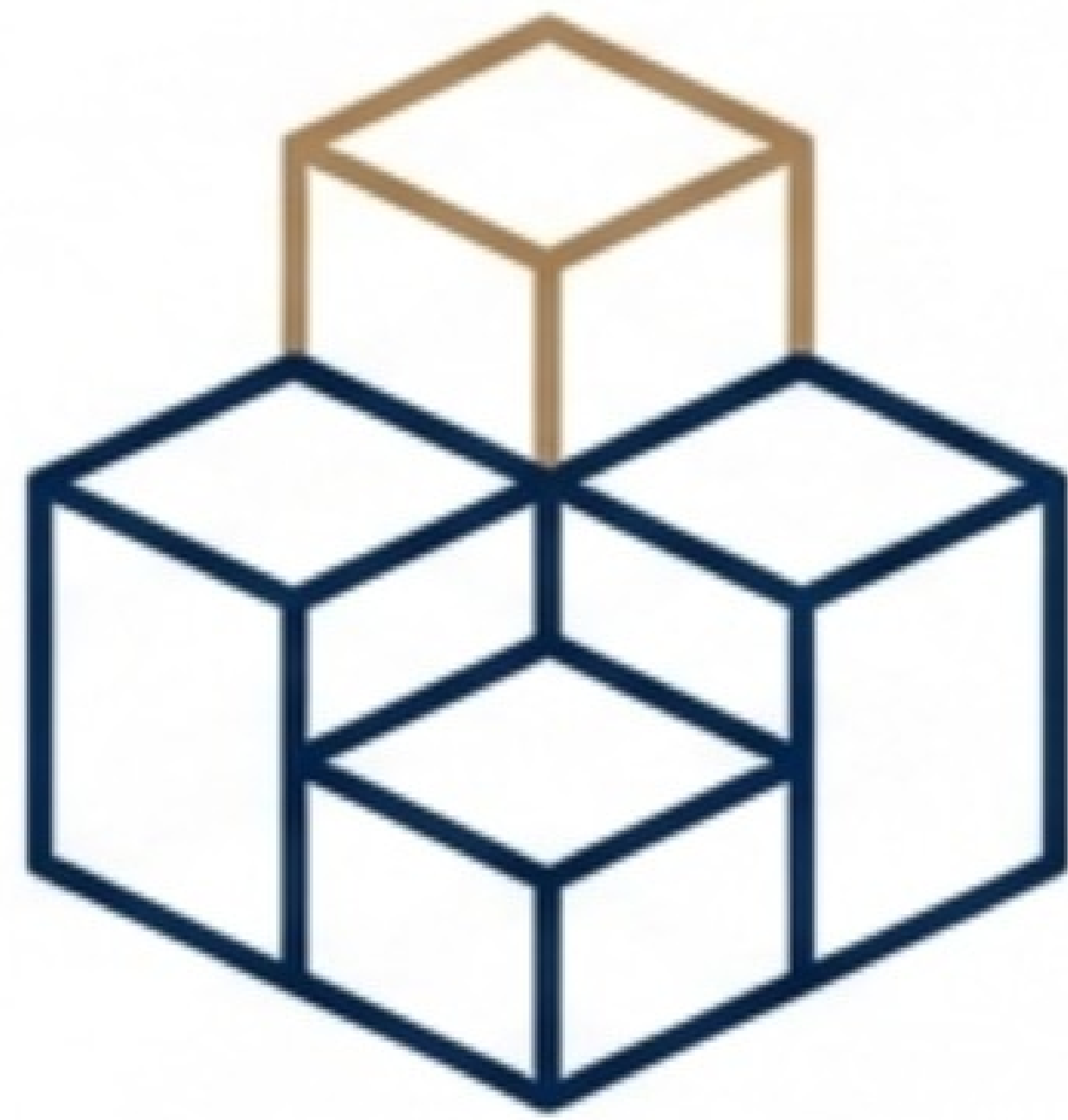
Conclusion (Derived Relationship)

Uses A, E, I, O Propositions in a strict format.

The Logical Framework: Key Takeaways



Statement
(True/False)



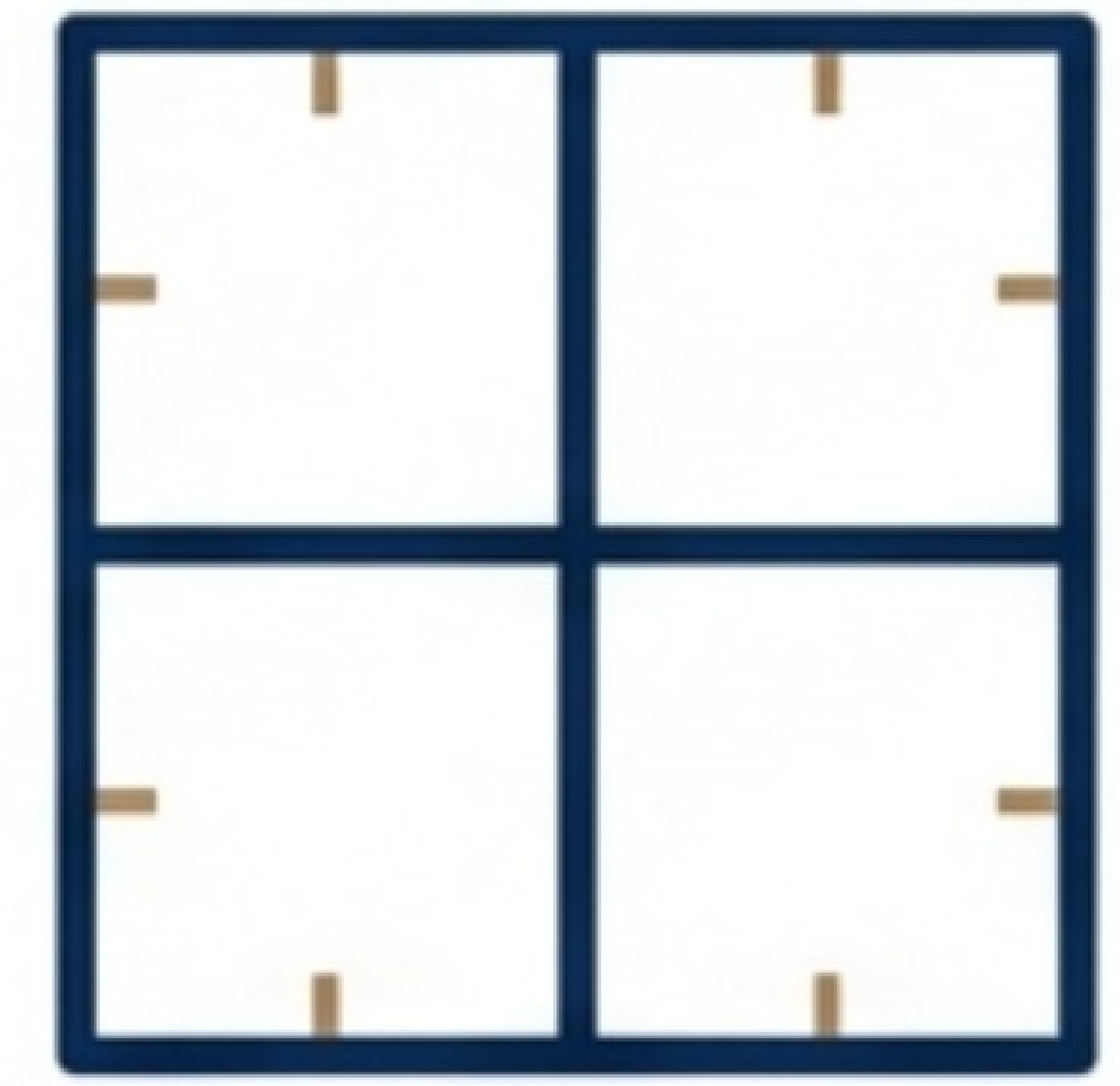
Argument
($P + P = C$)



Deductive
(Certainty)



Inductive
(Probability)



Propositions
(A, E, I, O)

Logic is the architecture of valid reasoning.