Why Mathematics, Science, and Humanities (Including Religion) Don't Have a Quarrel

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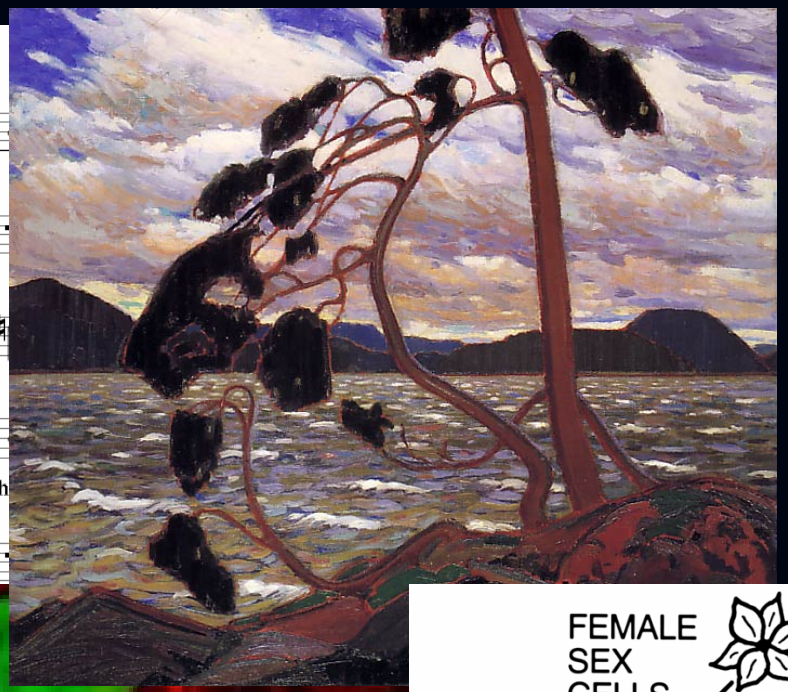
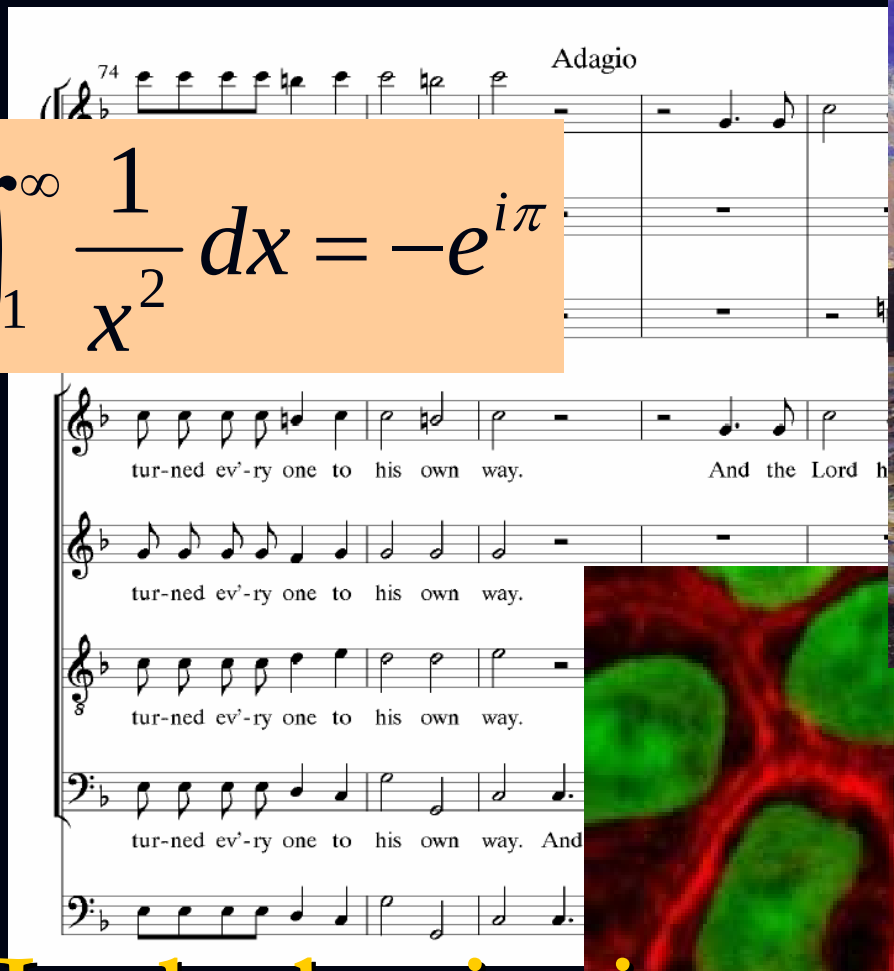
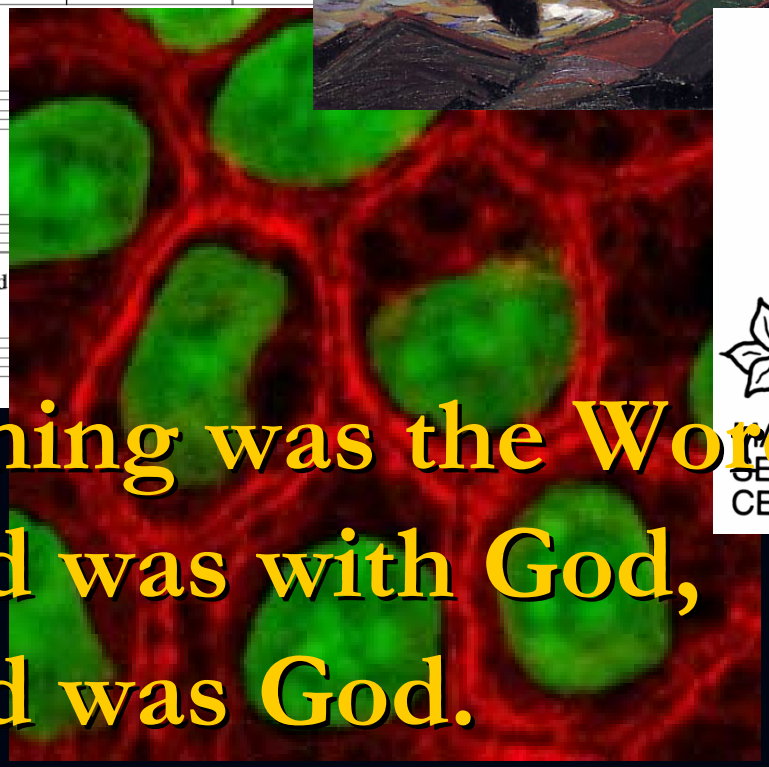
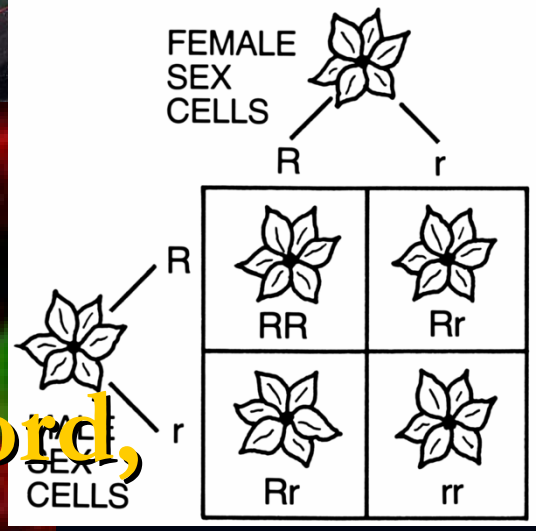
$$\int_1^{\infty} \frac{1}{x^2}\,dx = -e^{i\pi}$$







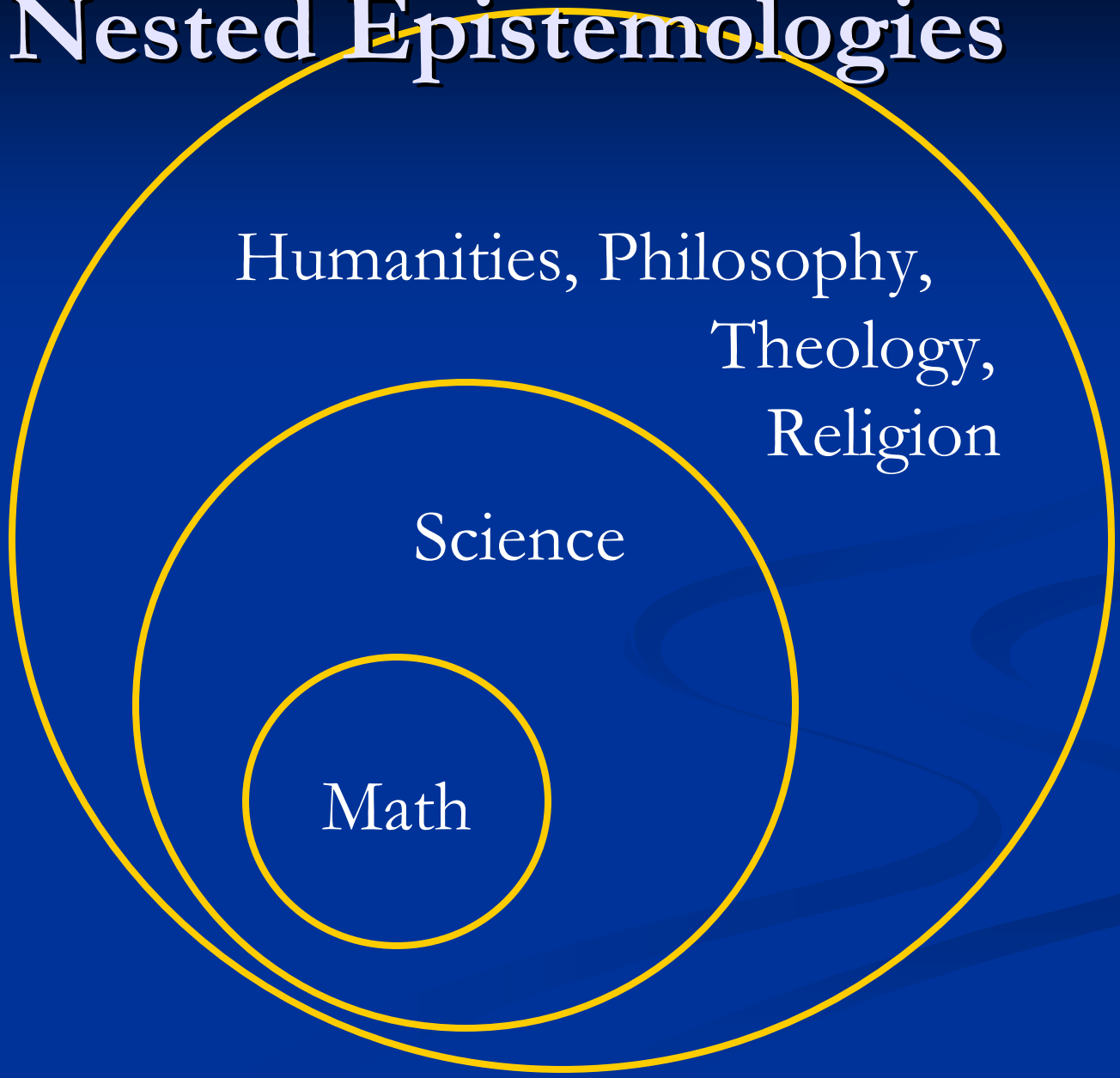


In the beginning was the Word,
and the Word was with God,
and the Word was God.

Views of Science and Religion

- Conflict Models
  - Science removes need for religion (materialism; Richard Dawkins, Daniel Dennet)
  - Bible scientifically accurate and contradicts modern science (literalism)
- No-Conflict Models
  - Religion a consequence of evolution
  - Different goals: Non-overlapping magisteria (Stephen Jay Gould)
  - Same goals: Nested epistemologies

Nested Epistemologies



Nested Epistemologies

Same goal:

Understanding of Truth and Reality

Different Methods:

Different ways of knowing

Different standards of warranty

Different kinds of questions

How do we know?

Deduction

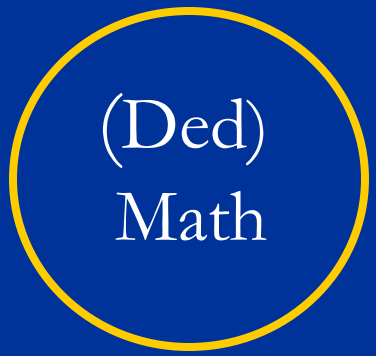
Reasoning from general to specific

All Andrews students own cars.

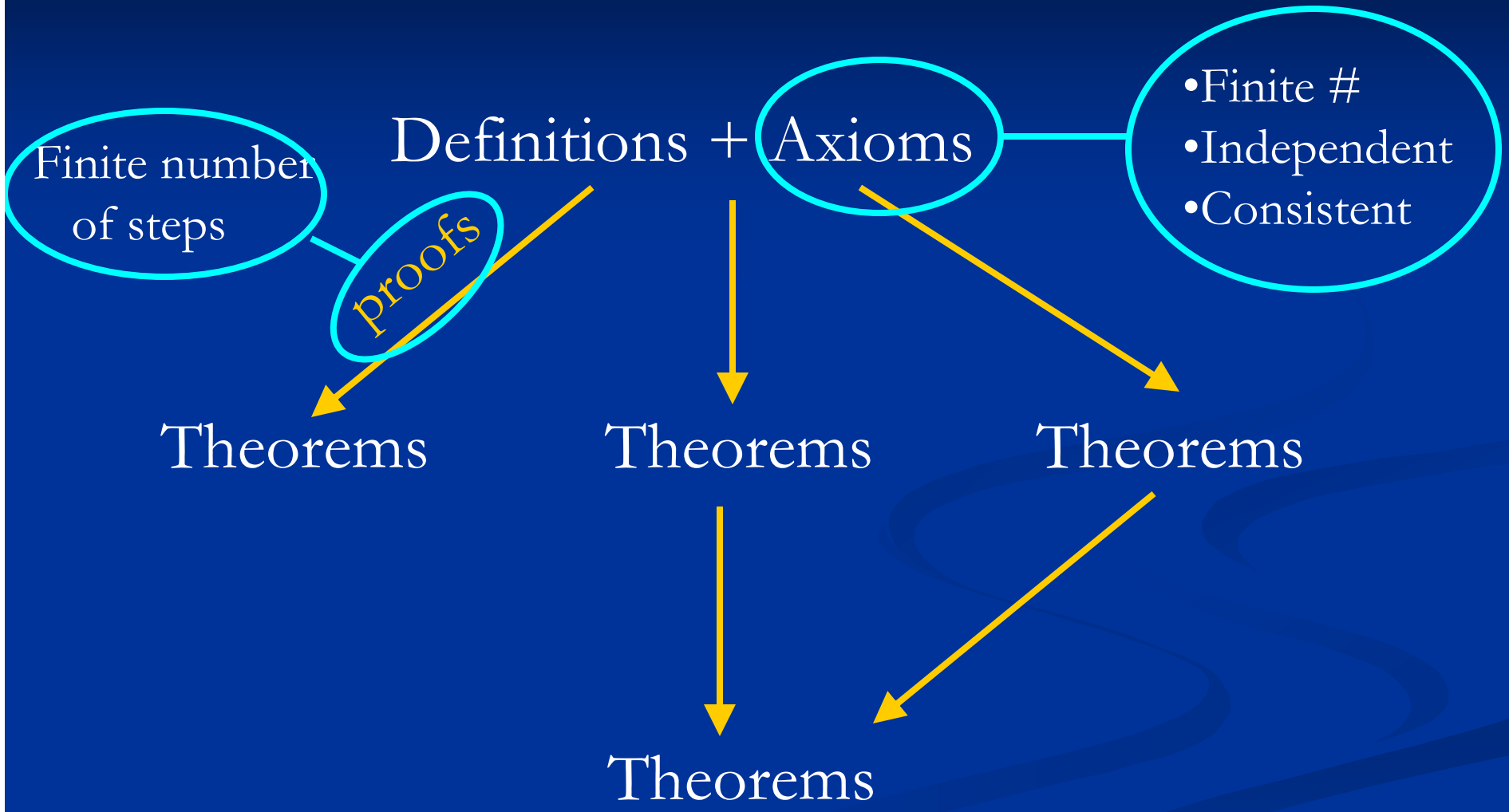
Ben is an Andrews student.

Therefore, Ben owns a car.

Mathematics = Deduction



The Mathematical Method



Example

Definition

$A \subset B \Leftrightarrow \forall x\left(x \in A \Rightarrow x \in B\right).$

Theorem

$A \subset B \wedge B \subset C \Rightarrow A \subset C.$

Proof

Assume $A \subset B \wedge B \subset C.$

Then $x \in A \Rightarrow x \in B \Rightarrow x \in C.$

$\therefore A \subset C.$

QED

Properties of Deduction

Conclusivity

- Mathematics is the only discipline with proof (100% conclusive argument)
- Conclusion must be true if premises are true.

Properties of Deduction

Scope (practical)

- Deduction extracts, teases out, information already contained (hidden) in the premises/axioms
- Deduction does not create new knowledge about reality
- Pure deduction cannot address questions about physical reality

Properties of Deduction

Scope (theoretical)

- Gödel's Incompleteness Theorem: No system at least as complicated as the natural number system can be finitely axiomatized.
- That is, given any finite set of axioms, there exist truths that cannot be proven.
- This theorem permanently doomed the efforts of Russell and Whitehead to completely mathematize philosophy

Induction

Reasoning from specific to general (reasoning from evidence)

All the Andrews students I've taught this year own cars. [Susan owns a car; Jason owns a car; Chantay owns a car….]

Therefore, all Andrews students own cars.

Properties of Induction

Conclusivity

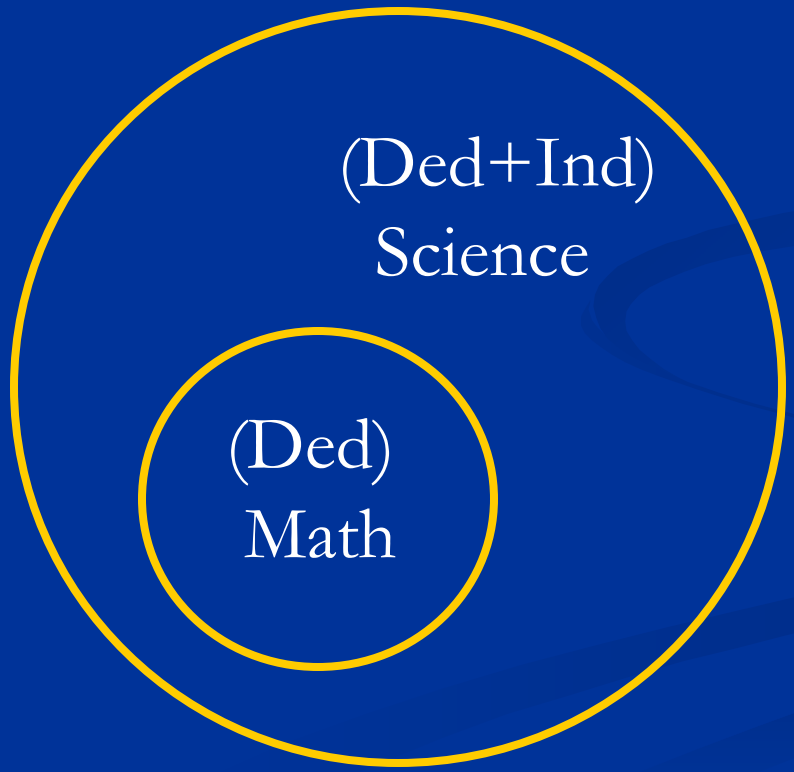
- Not 100% conclusive argument (unless all data points are observed)
- Level of confidence in conclusion based on strength of data, rigor of analysis, predictability

Properties of Induction

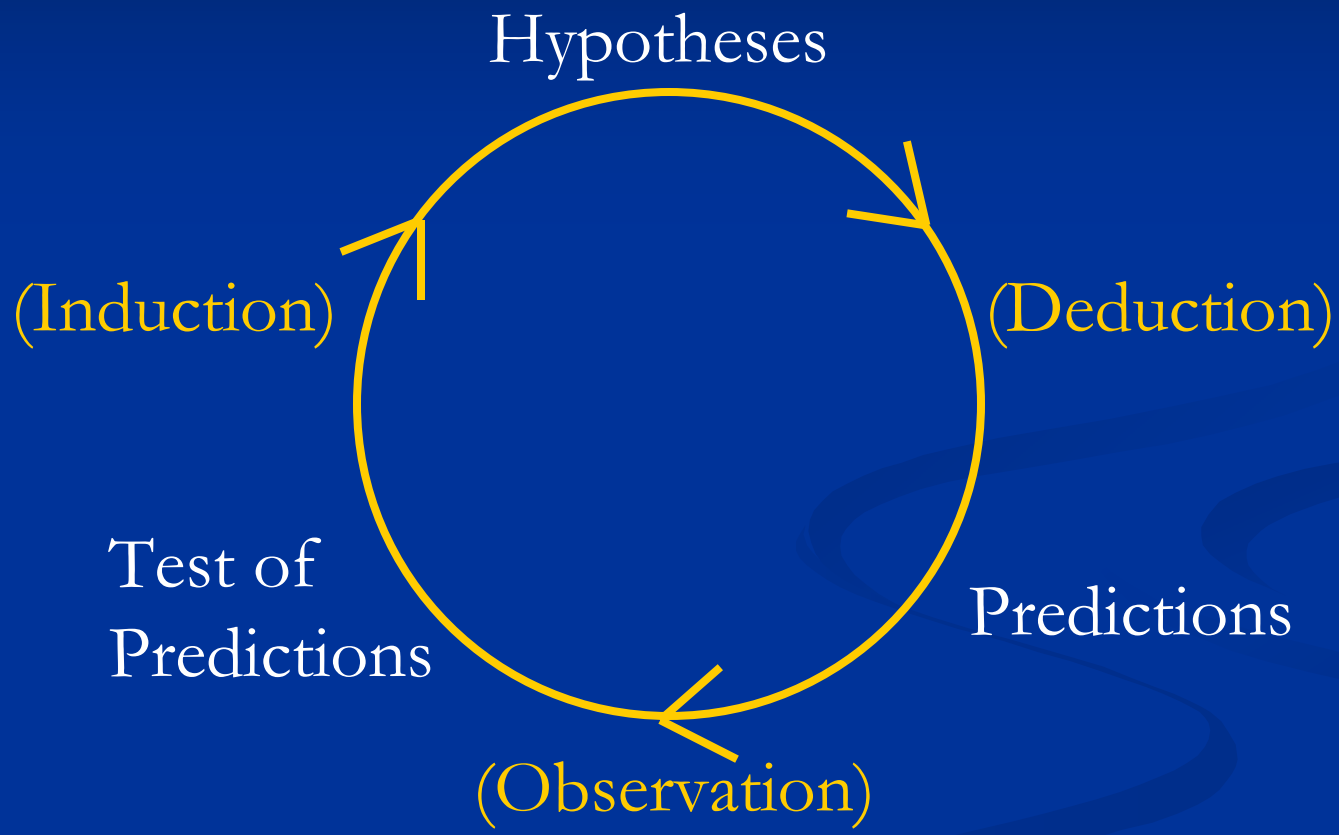
Scope

- Induction abstracts patterns observed in data
- Induction creates new knowledge about physical reality
- Cannot address questions about meaning

Science = Deduction + Induction



The Scientific Method

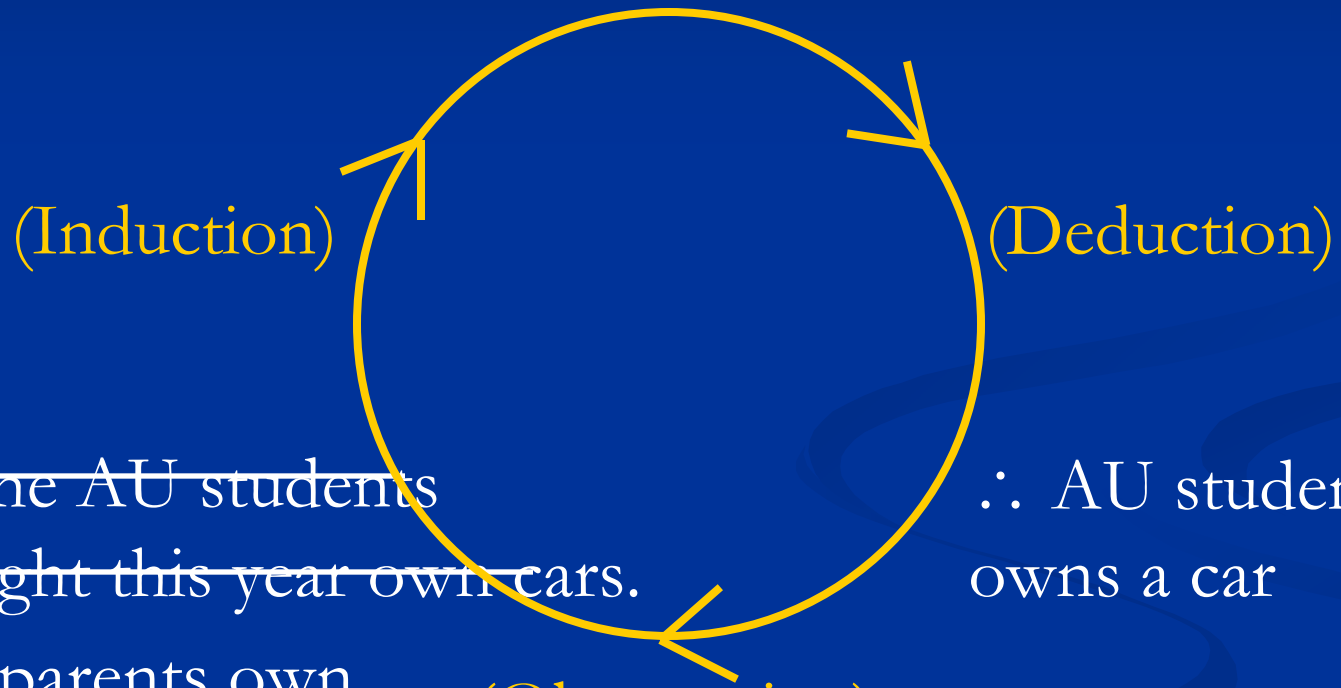


A good theory describes, explains, and PREDICTS.

The Scientific Method

All AU students drive cars

~~All AU students own cars~~



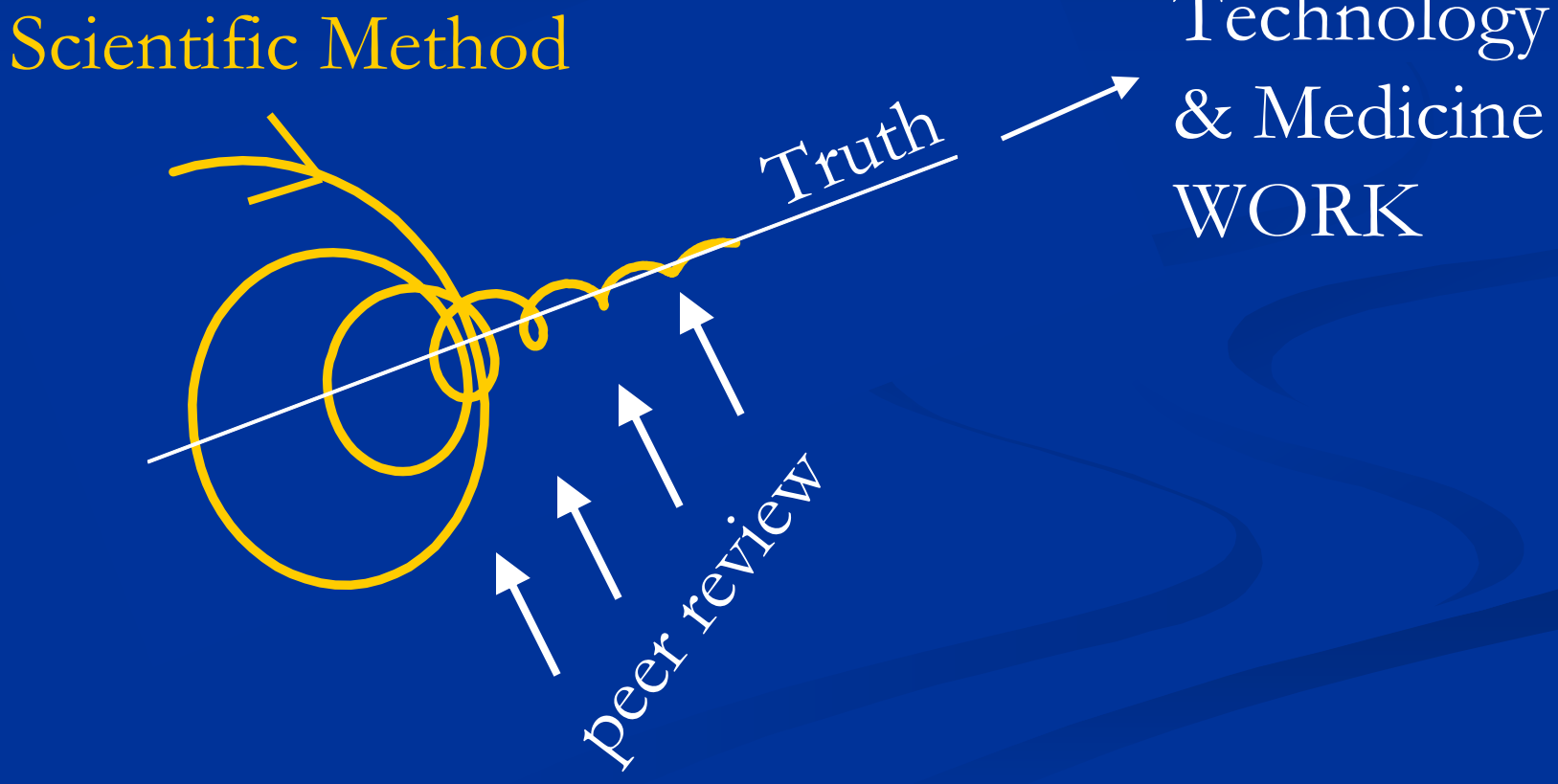
~~All the AU students~~

~~I taught this year own cars.~~

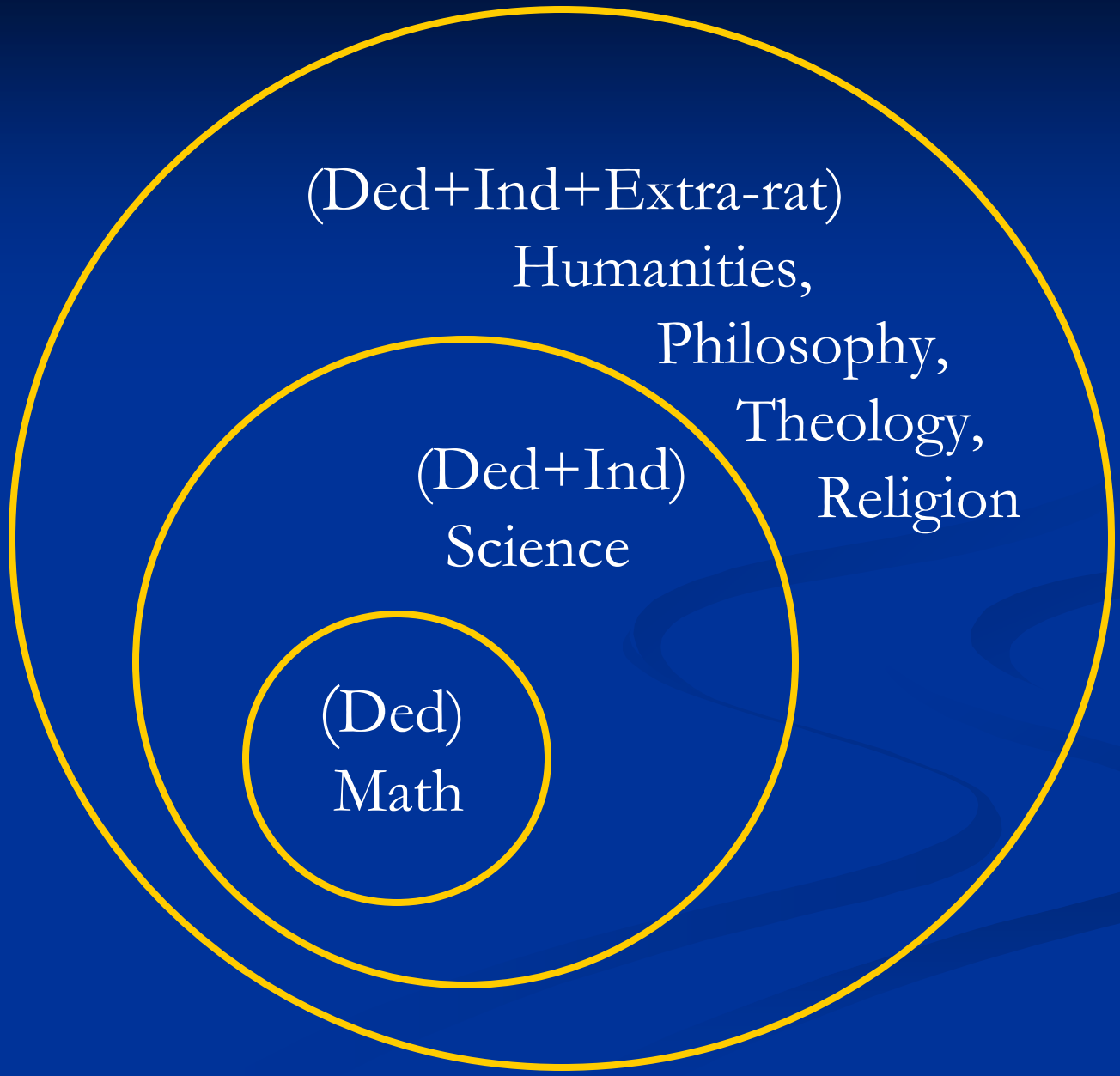
Ben's parents own the car he drives

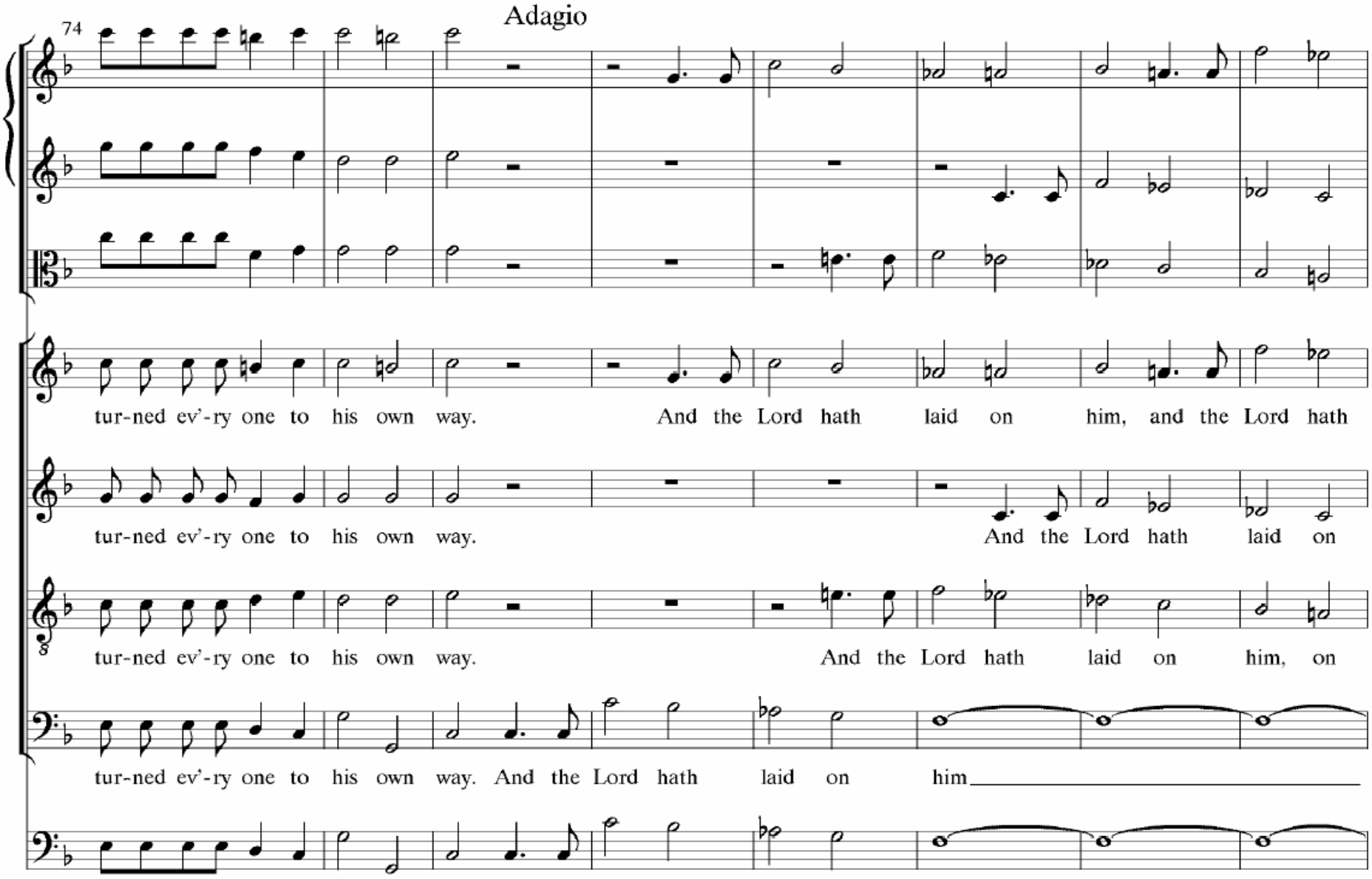
∴ AU student Ben owns a car

Scientific Pursuit of Truth

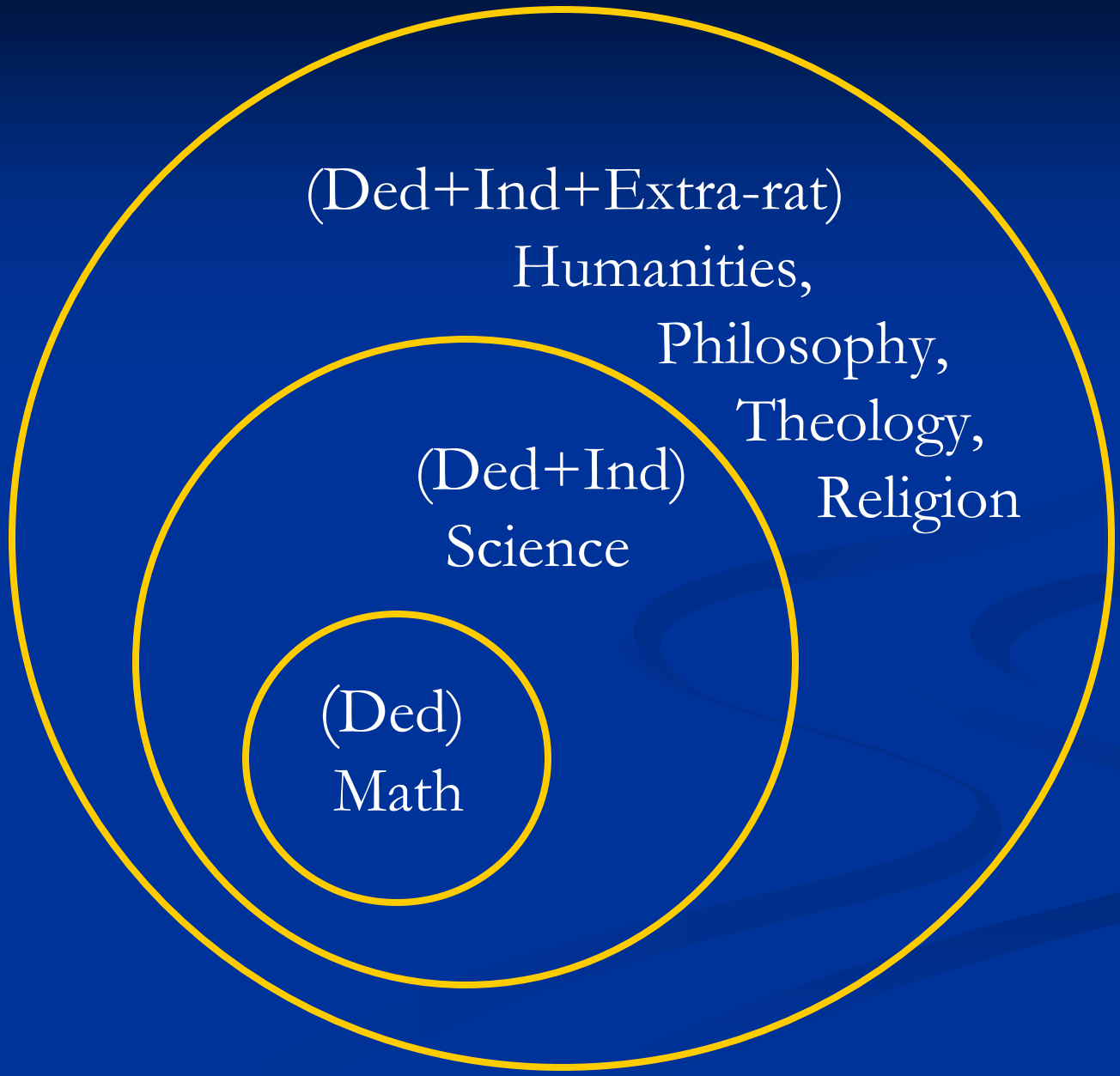


Humanities = Deduction + Induction + Extra-rational Ways of Knowing


(Ded+Ind+Extra-rat)
Humanities,
Philosophy,
Theology,
Religion
(Ded+Ind)
Science
(Ded)
Math


Adagio
74
tur-ned ev'-ry one to his own way. And the Lord hath laid on him, and the Lord hath
tur-ned ev'-ry one to his own way. And the Lord hath laid on
tur-ned ev'-ry one to his own way. And the Lord hath laid on him, on
tur-ned ev'-ry one to his own way. And the Lord hath laid on him

In the beginning was the Word,
and the Word was with God,
and the Word was God.


(Ded+Ind+Extra-rat)
Humanities,
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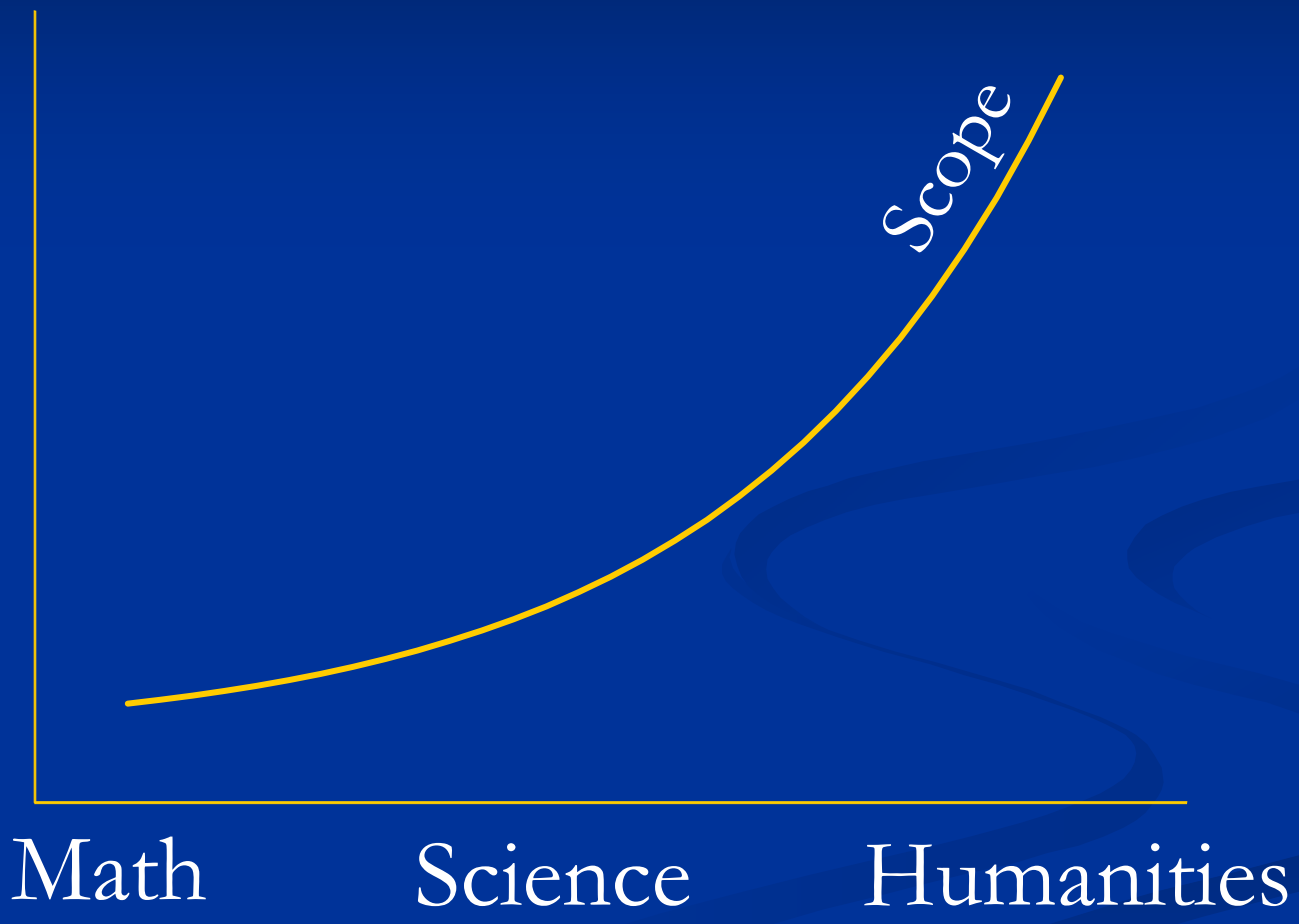
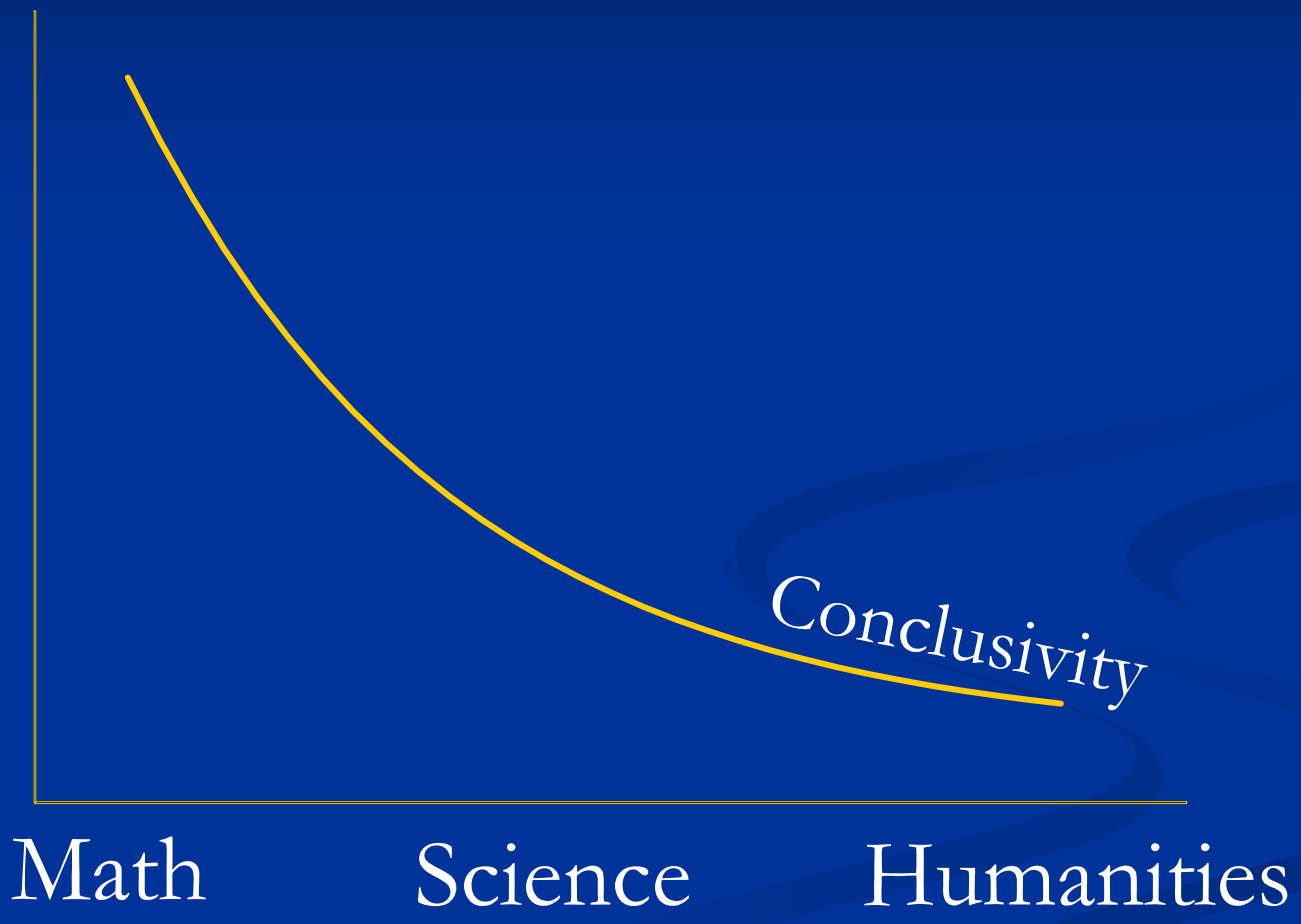
(Ded+Ind)
Science
(Ded)
Math

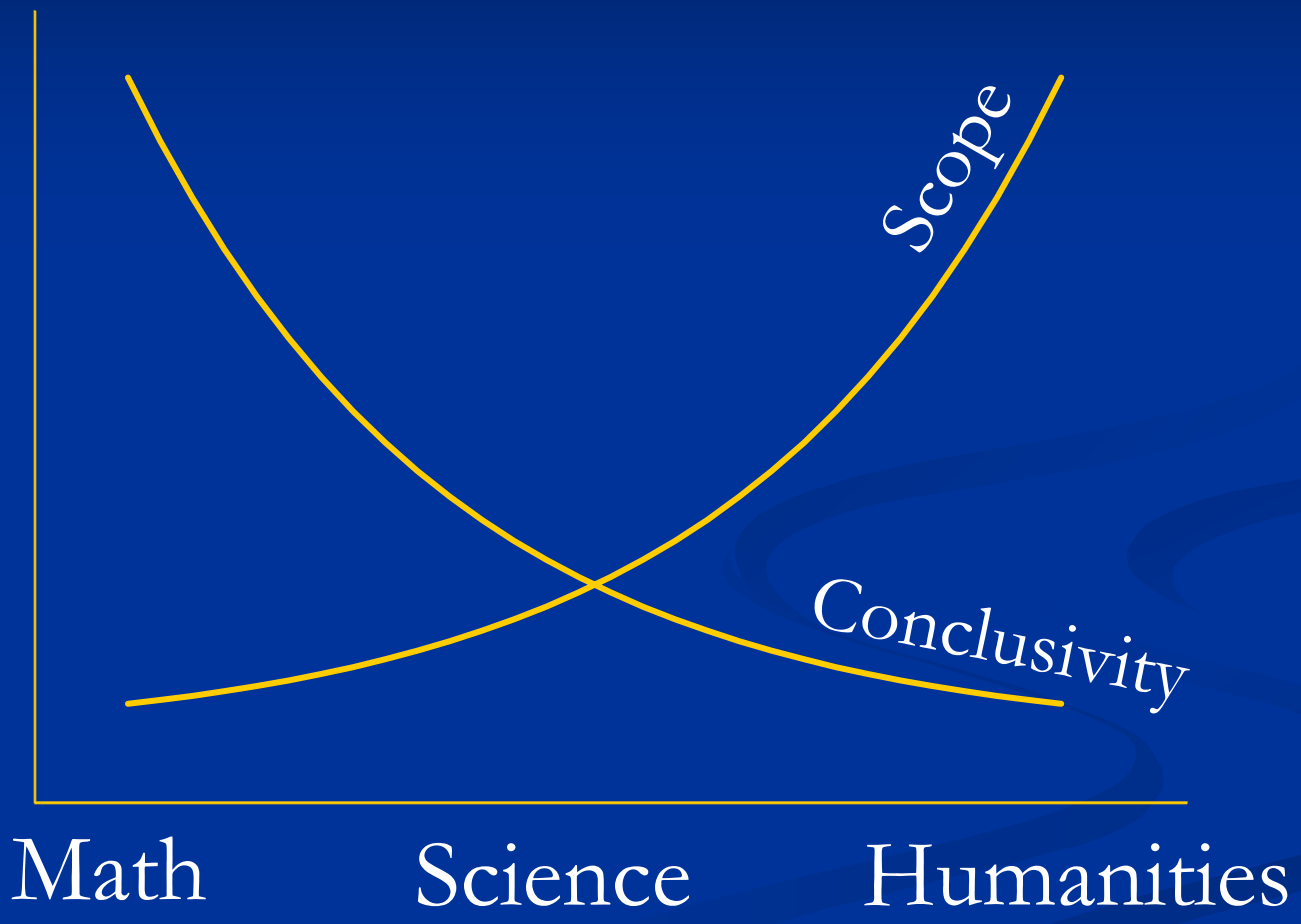
Scope



Conclusivity

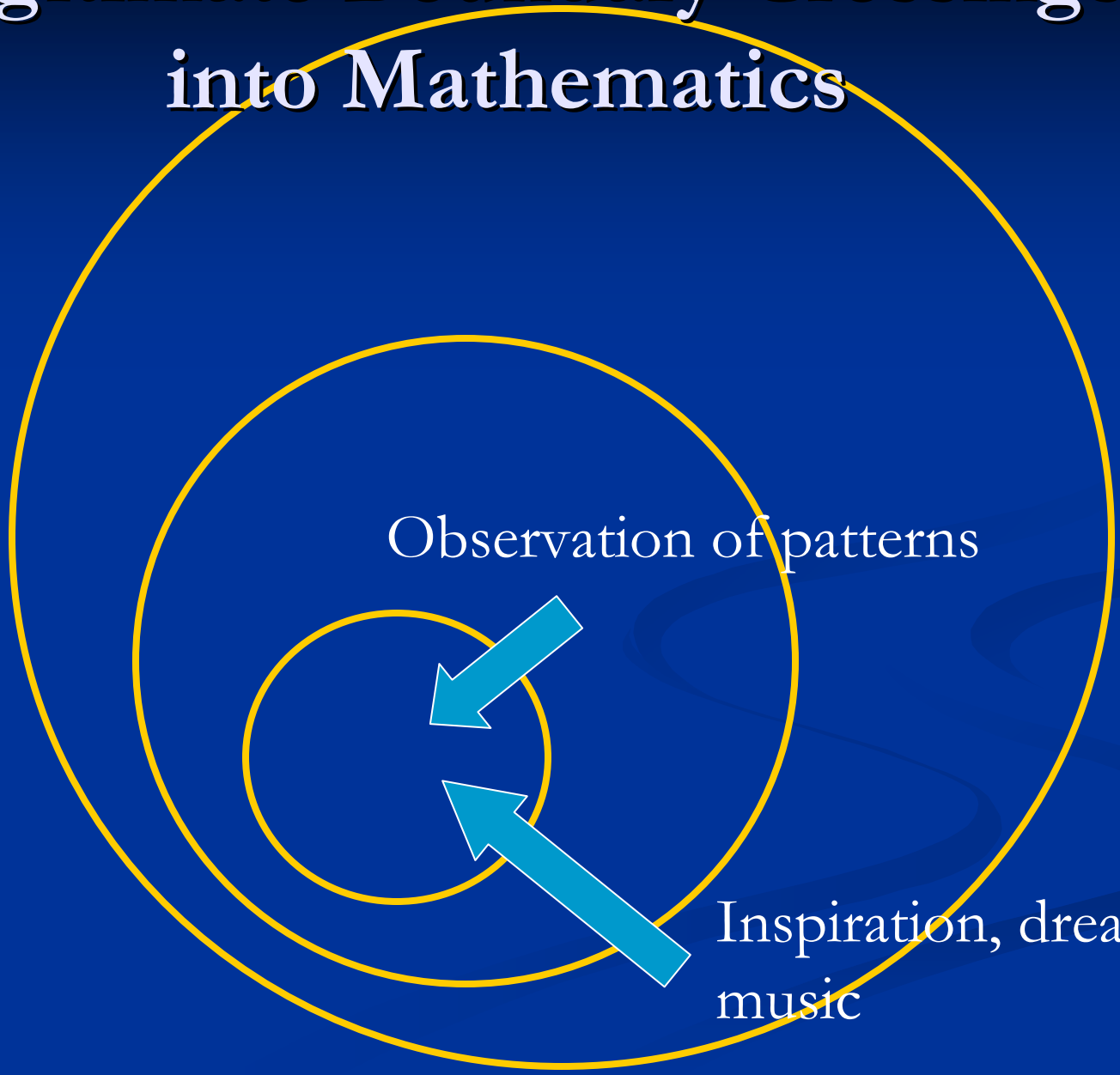


Conclusivity and Scope

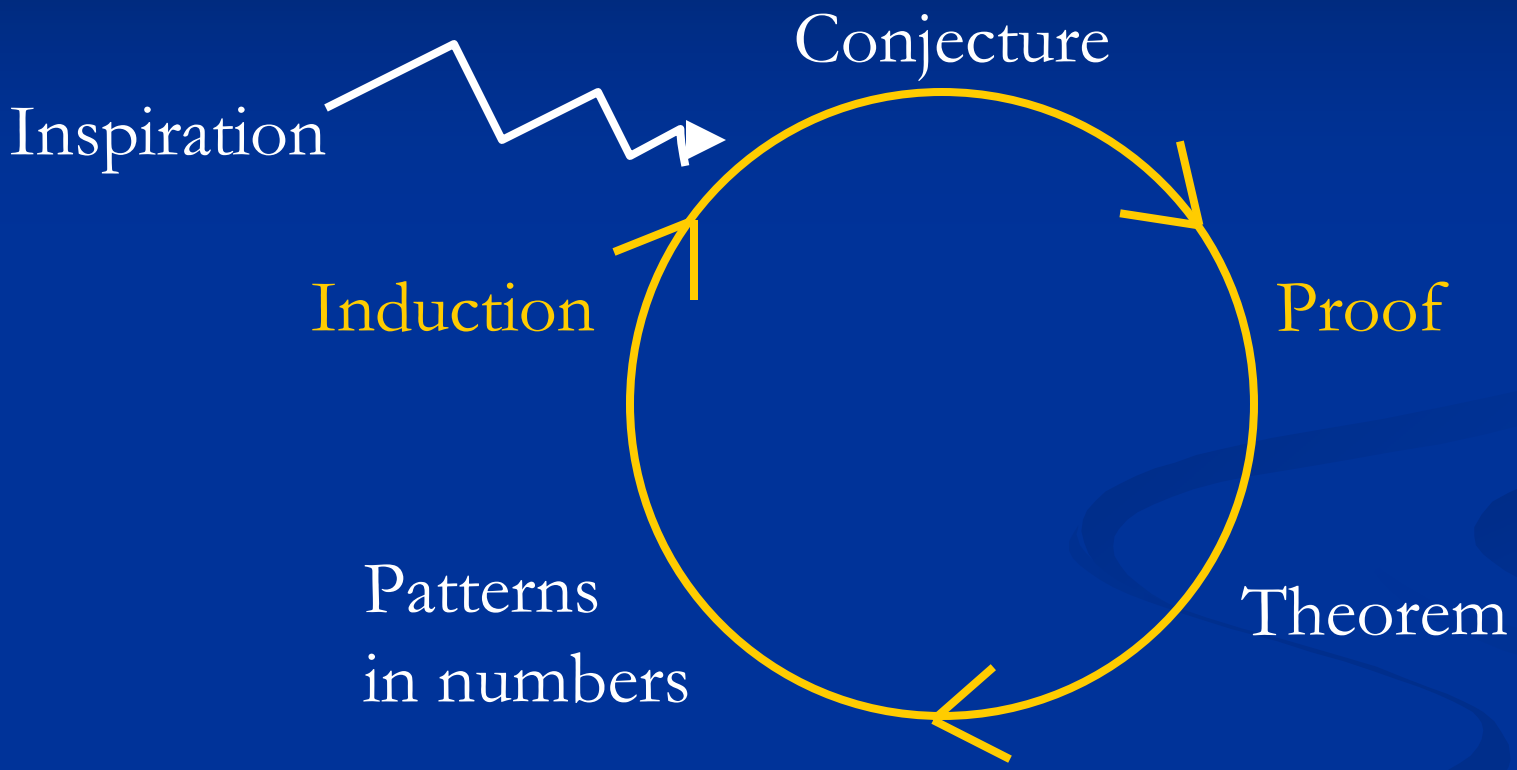


How Permeable Are the Boundaries?

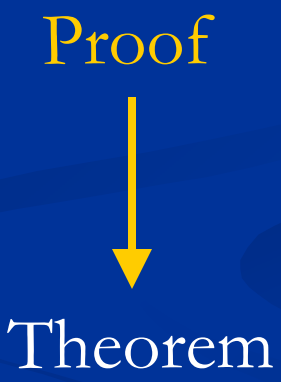
Legitimate Boundary Crossings into Mathematics



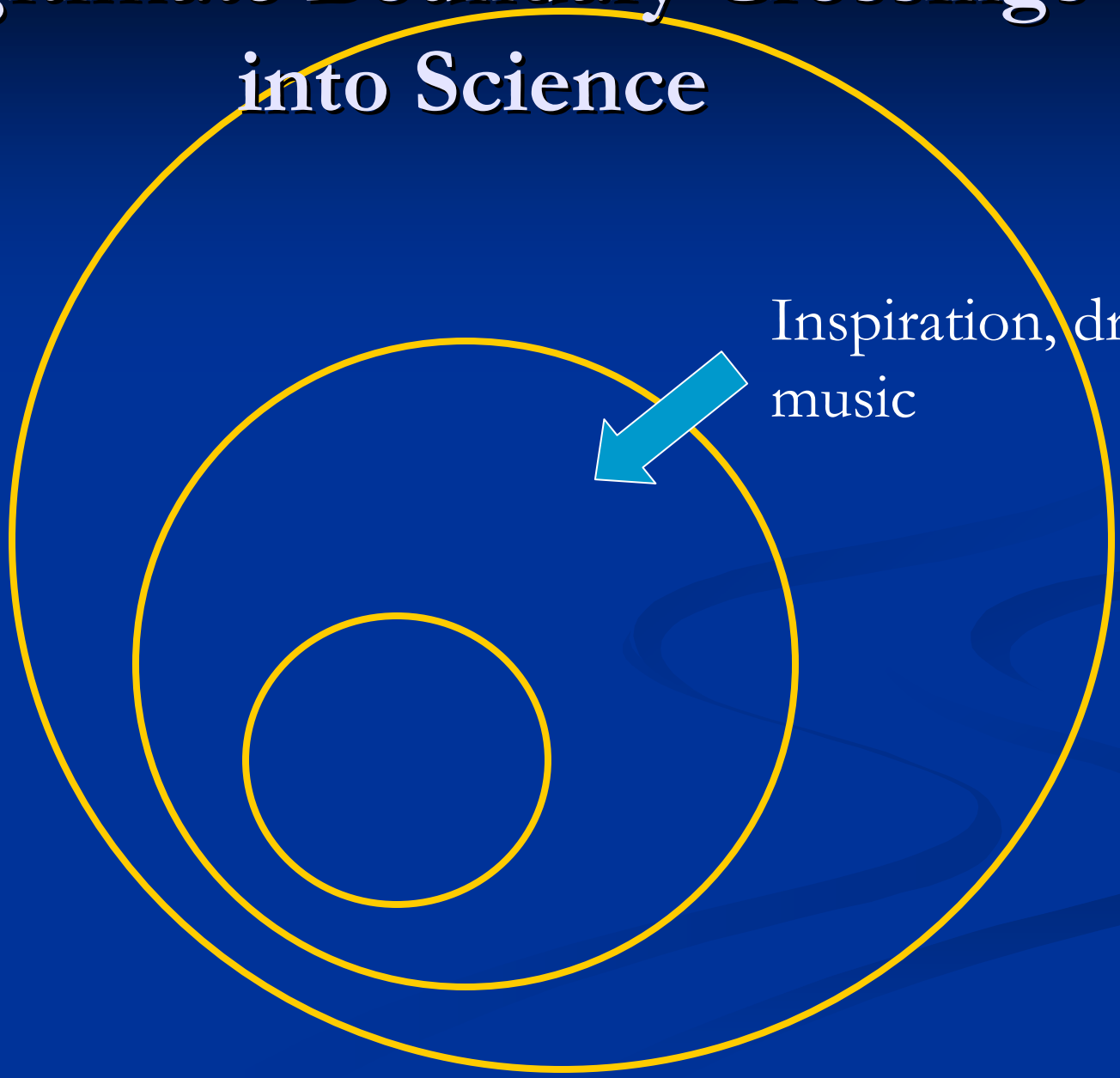
How Mathematics is Created



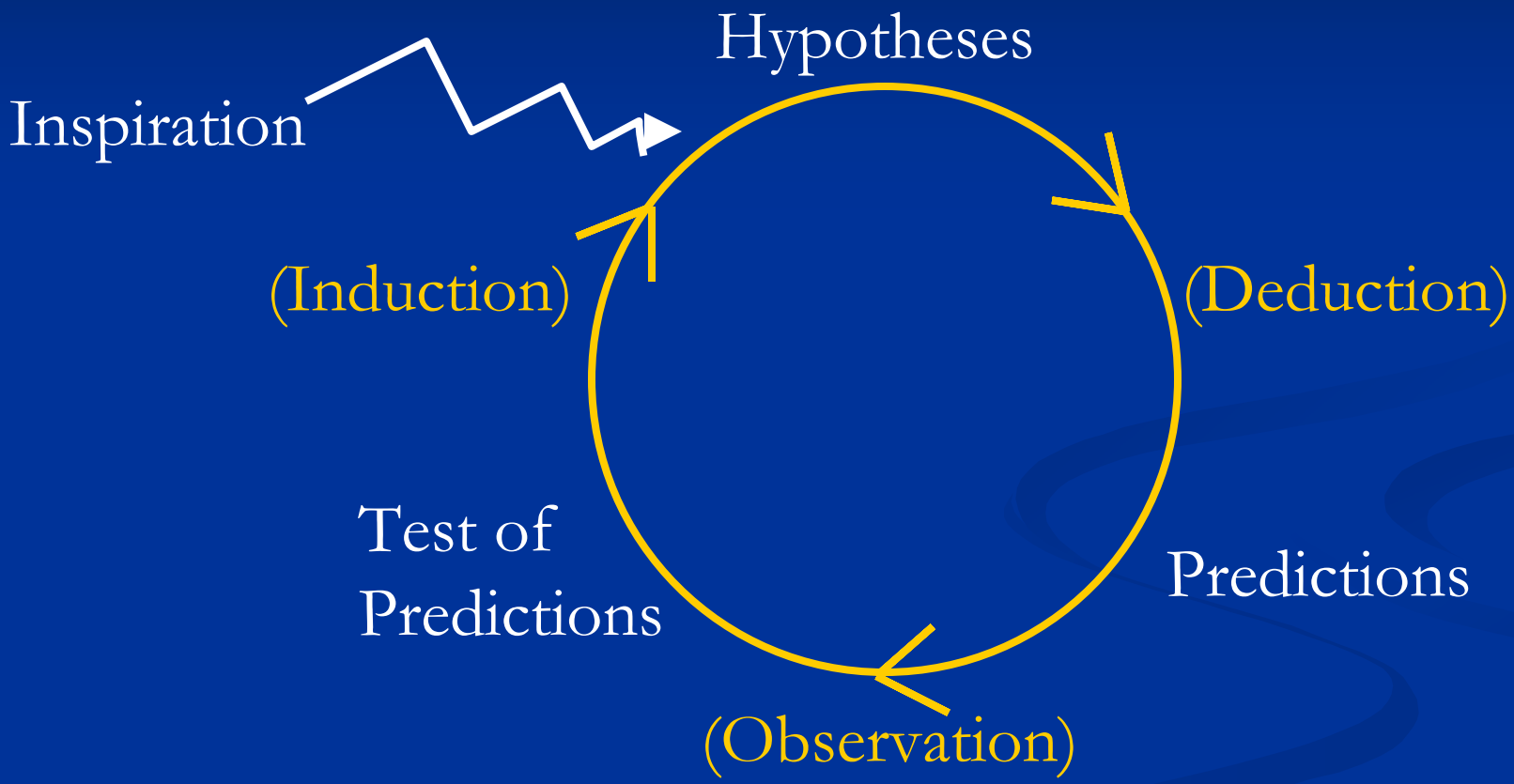
Final Product in Mathematics



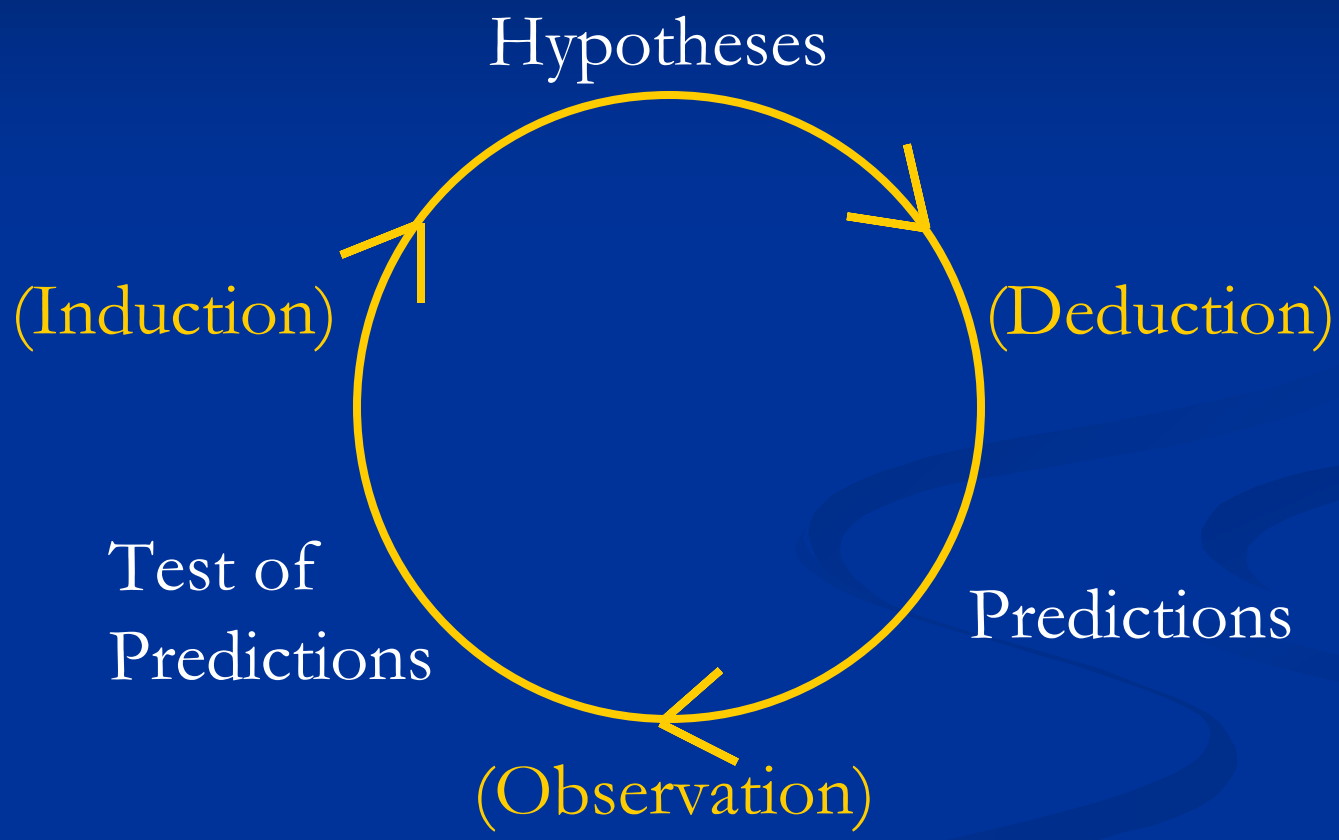
Legitimate Boundary Crossings into Science



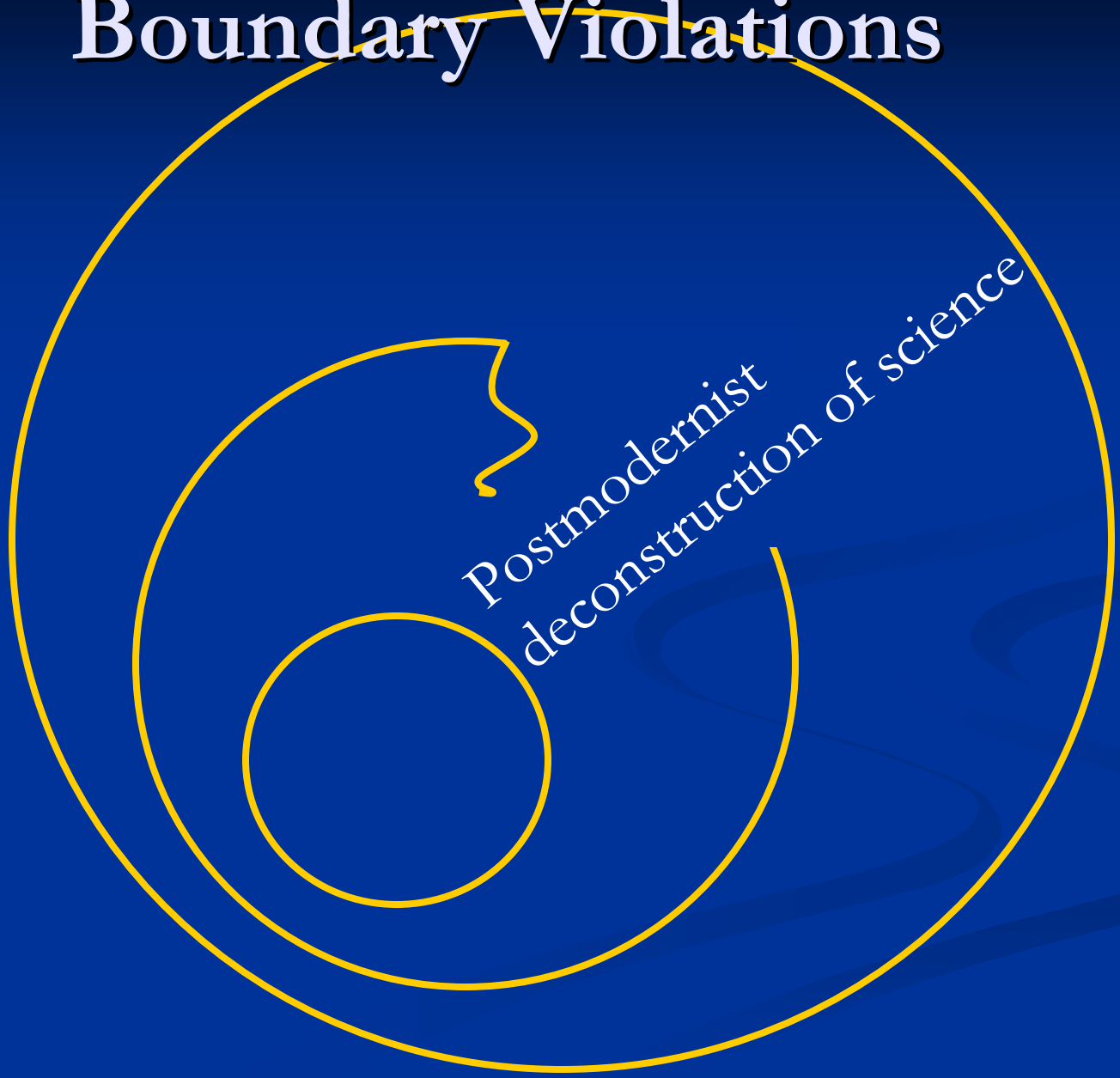
How Science is Created



Final Product in Science



Boundary Violations



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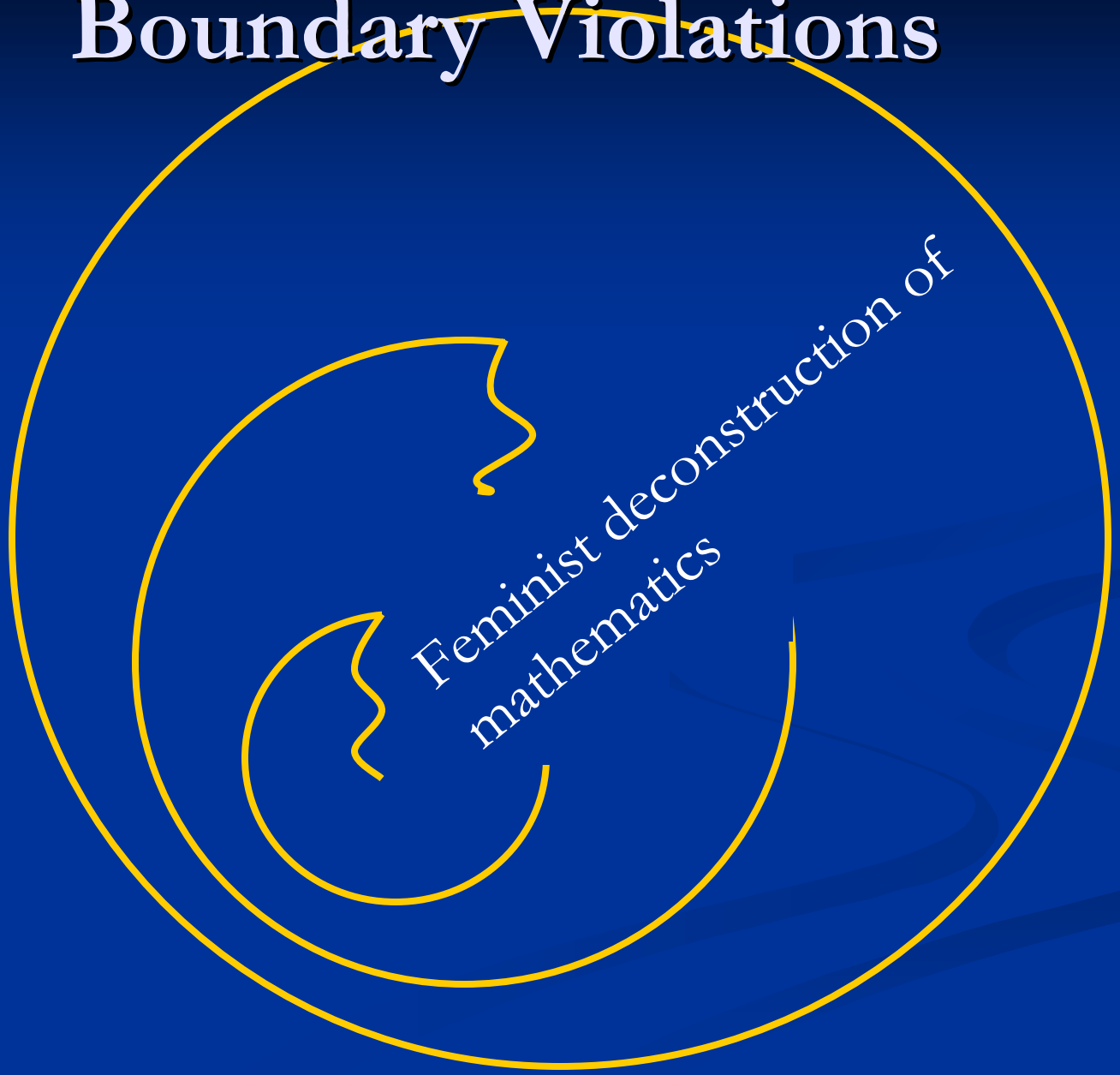

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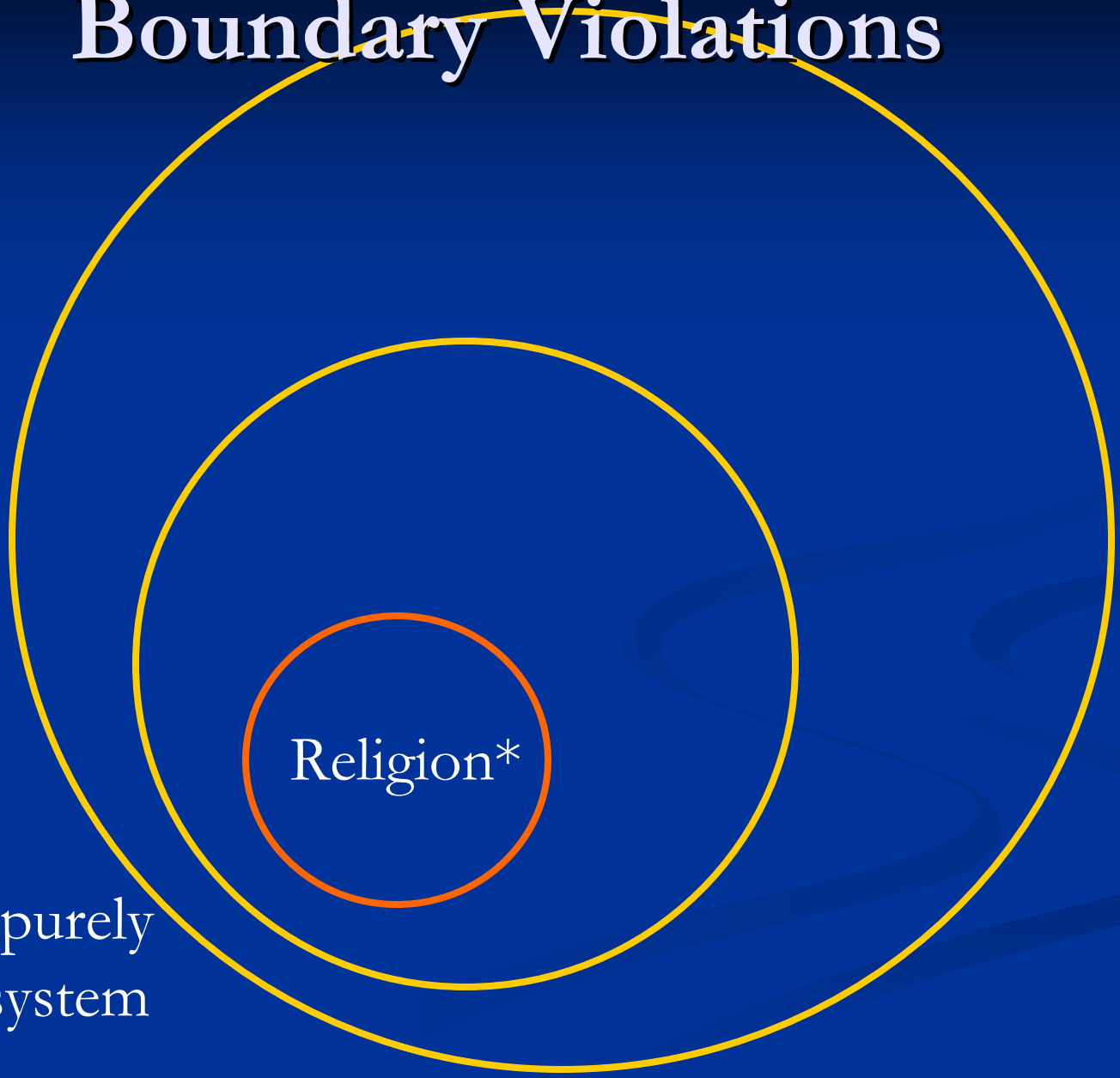
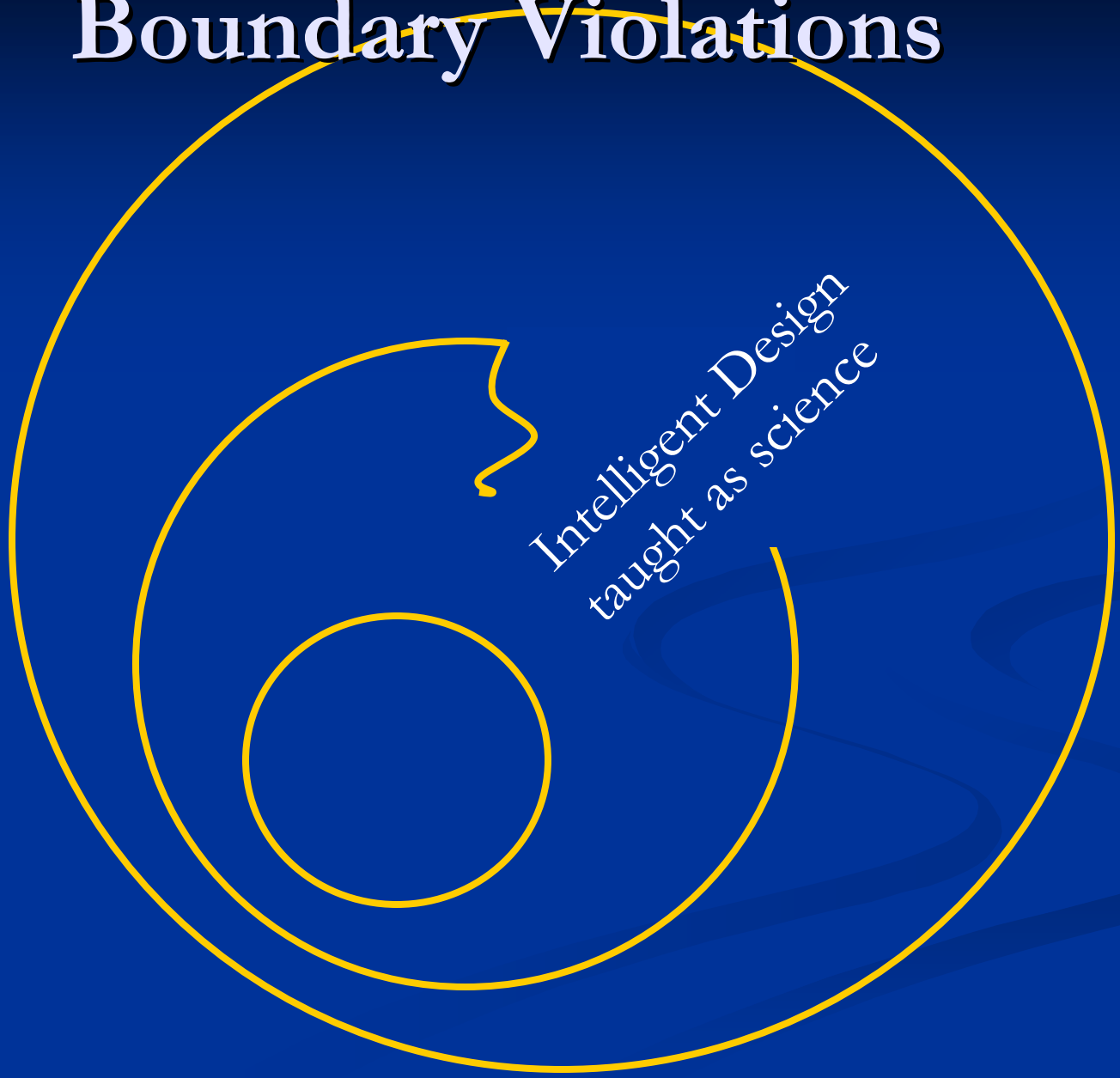


*posing as purely deductive system

Boundary Violations



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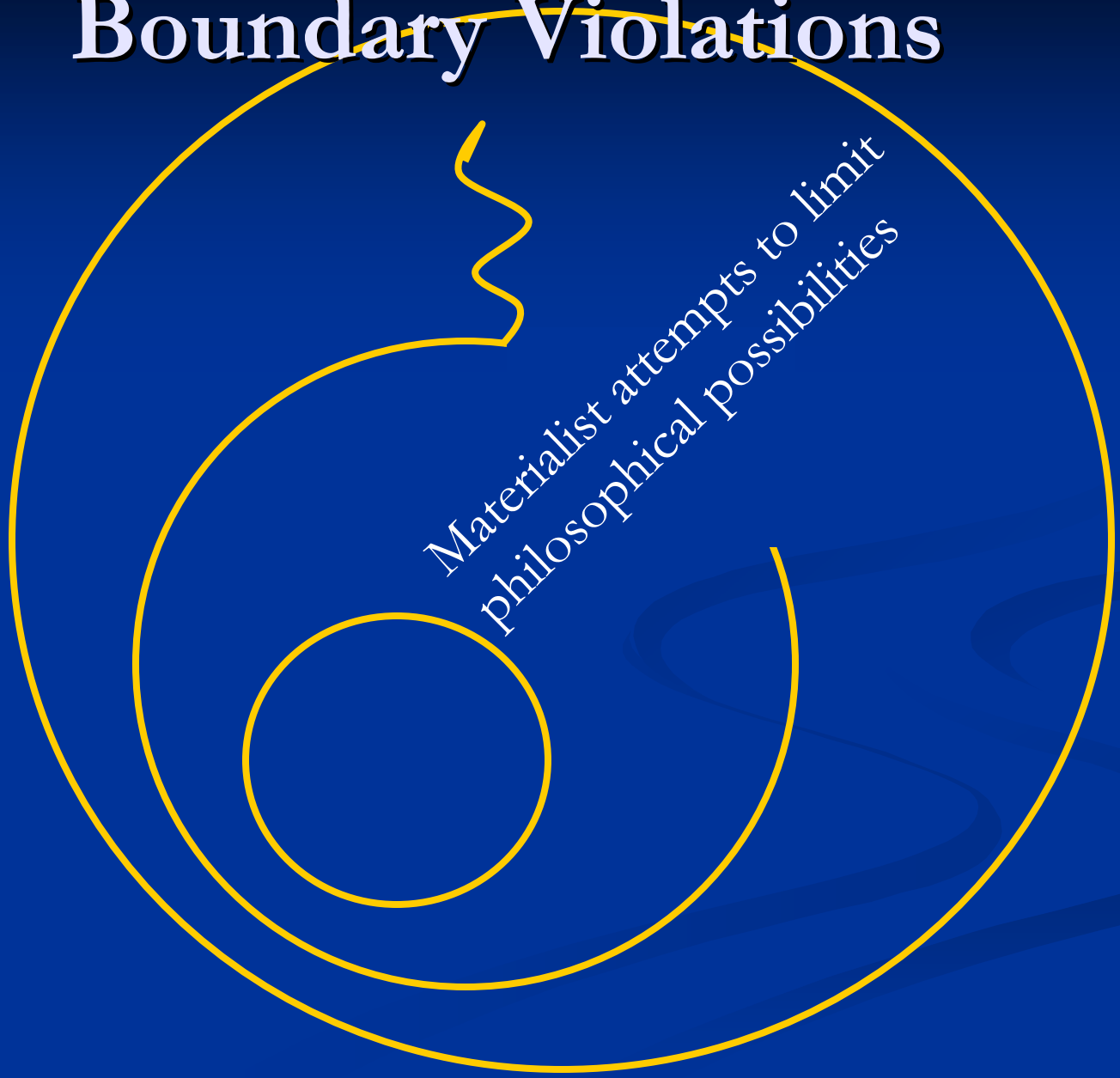

Summary

- Same goal.
- Different types of knowing.
- Different kinds of questions.
- Different standards of warranty.

Summary

- Bigger circles use more types of epistemology and can address more types of questions
- Smaller circles provide more warranty to convince someone else of what you know

Summary

- Bigger circles include and hence cannot logically contradict smaller circles (paradoxes—yes; contradictions—no)
- Bigger circles nourish and inspire the smaller circles but cannot be included in the final arguments or products of the smaller circles