Science before Science Study Group

Week Eighteen

St. Thomas Aquinas,
Pray for us.

St. Albert the Great,
Pray for us.

Prayer before Study

Almighty God, You who are the creator of all things and our loving Father, send us Your Holy Spirit to illuminate our minds so that we can understand how You have revealed Yourself to us through the world around us.

Grant to us
keenness of mind
capacity to remember,
skill in learning,
subtlety to interpret,
and eloquence in speech.

May You guide the beginning of our work, direct its progress, and bring it to completion.

We ask this through Thy Son, Jesus Christ, Our Lord.

Amen

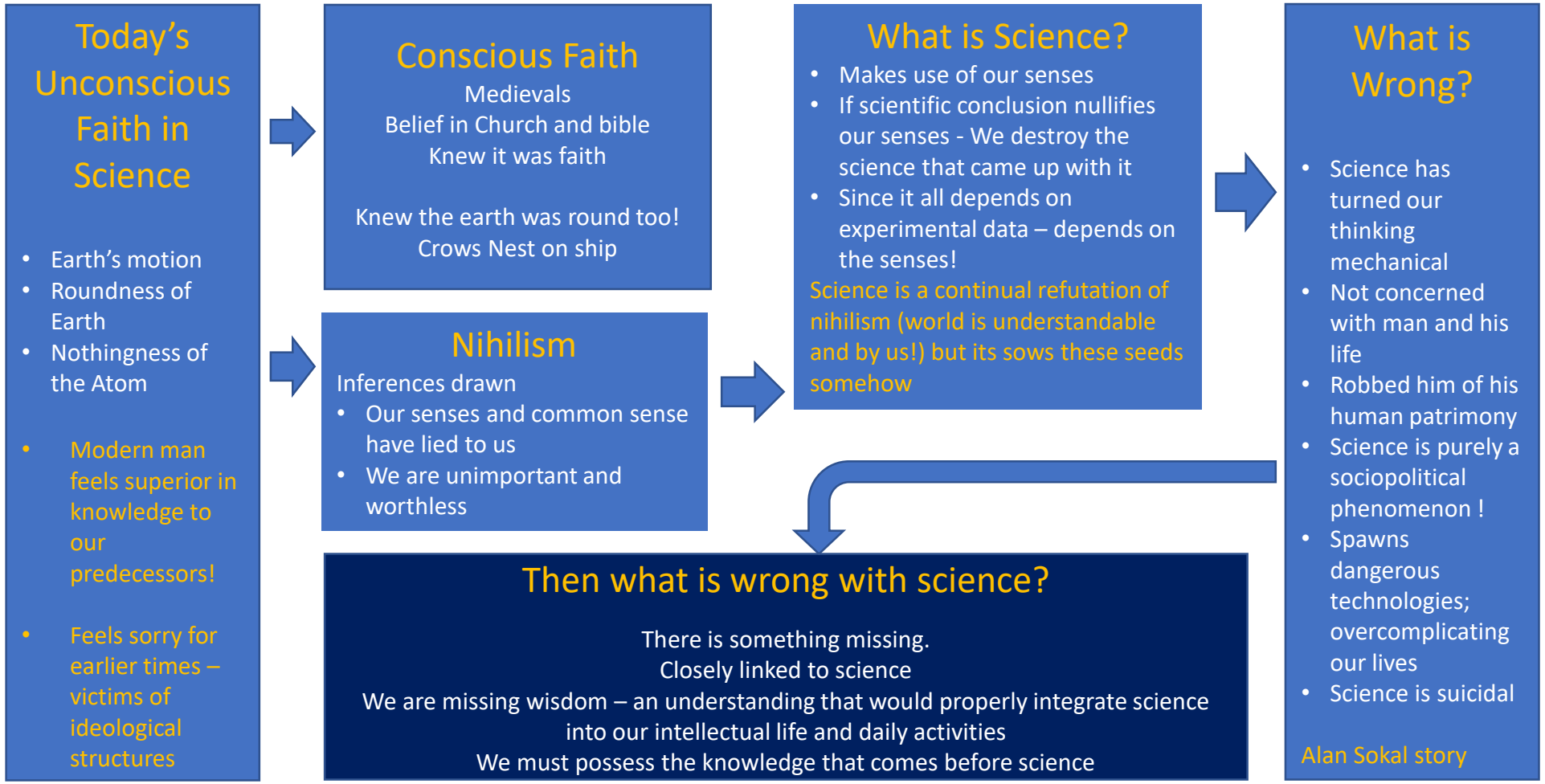
How then should we do science?

- What do we mean by science?
  - Does the answer to the broader question change the way we do the modern specialized sciences?
  - Does is lead to better modern science?
- Science is bigger than the empiriological sciences!
  - Philosophy, *properly speaking*, includes all knowledge (Scientia) – in wide sense
  - Philosophy, *in the narrow sense*, studies first principles and precedes modern science
  - Philosophy (in wide sense) includes the modern sciences and is before it as the whole is before the parts
  - Philosophy (in the narrow sense) precedes modern science because it is required by modern science
  - Philosophy (in both senses) is the science before (modern) science
- Modern sciences (physics, biology, chemistry) should be cognizant of being part of a larger science of *physica*

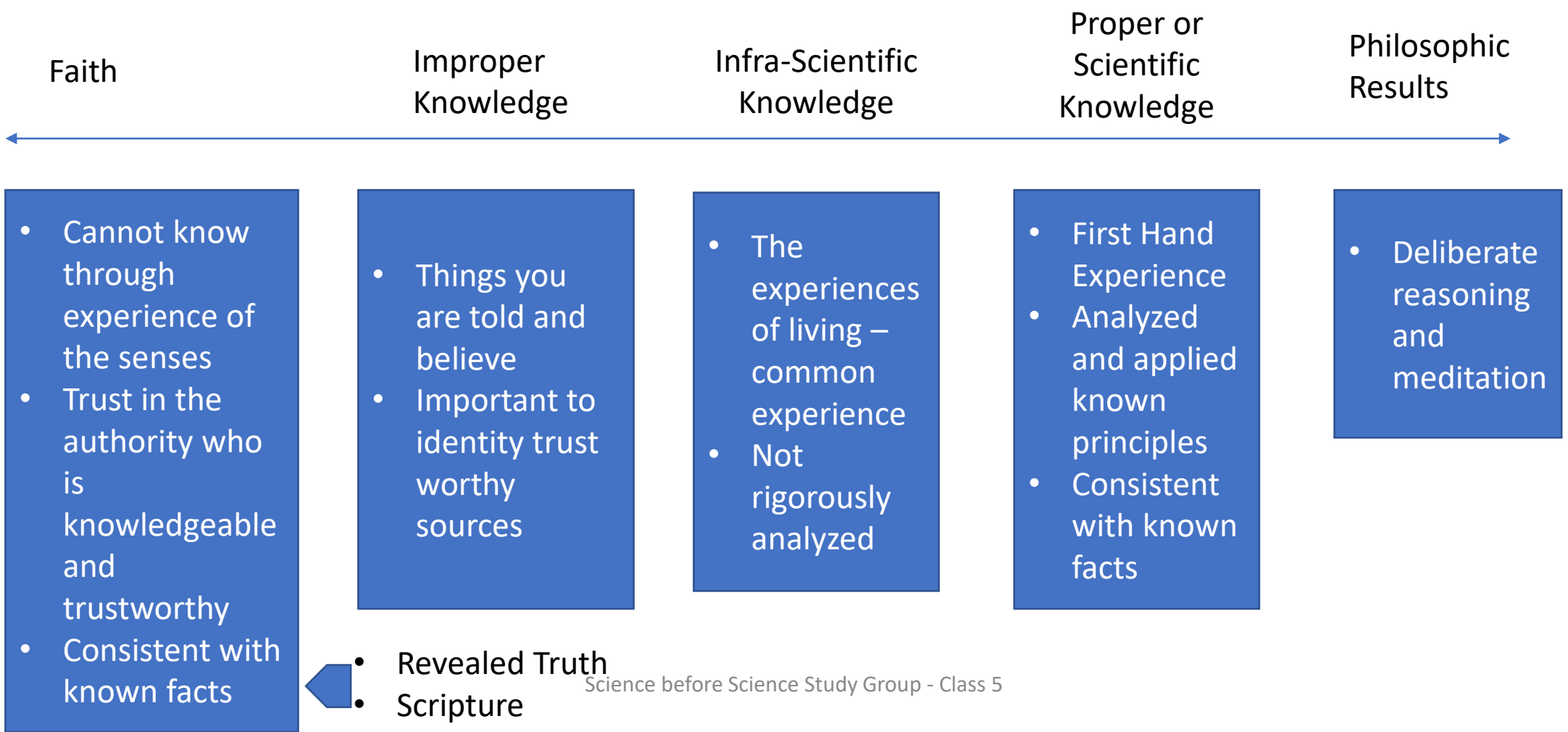
What does this ‘before’ consist of? Chapter 2: A False Sense of Certitude

- Chapter 2 – Proper and Improper Knowledge
  - Proper – we have direct sensorial knowledge of and have ourselves done the intellectual work necessary to come to relevant conclusions (rather than relying on others)
  - Improper – is really at bottom a species of belief that we obtain from the culture around us that we trust
  - If not aware of distinction – then we will mistake one for the other
    - We take cultural presuppositions on blind faith
    - These are often foundational – if wrong – structure supporting our knowledge will fail
    - Will cause a narrowing of our knowledge (unconsciously)
  - The fertile culture that support science itself will be in danger

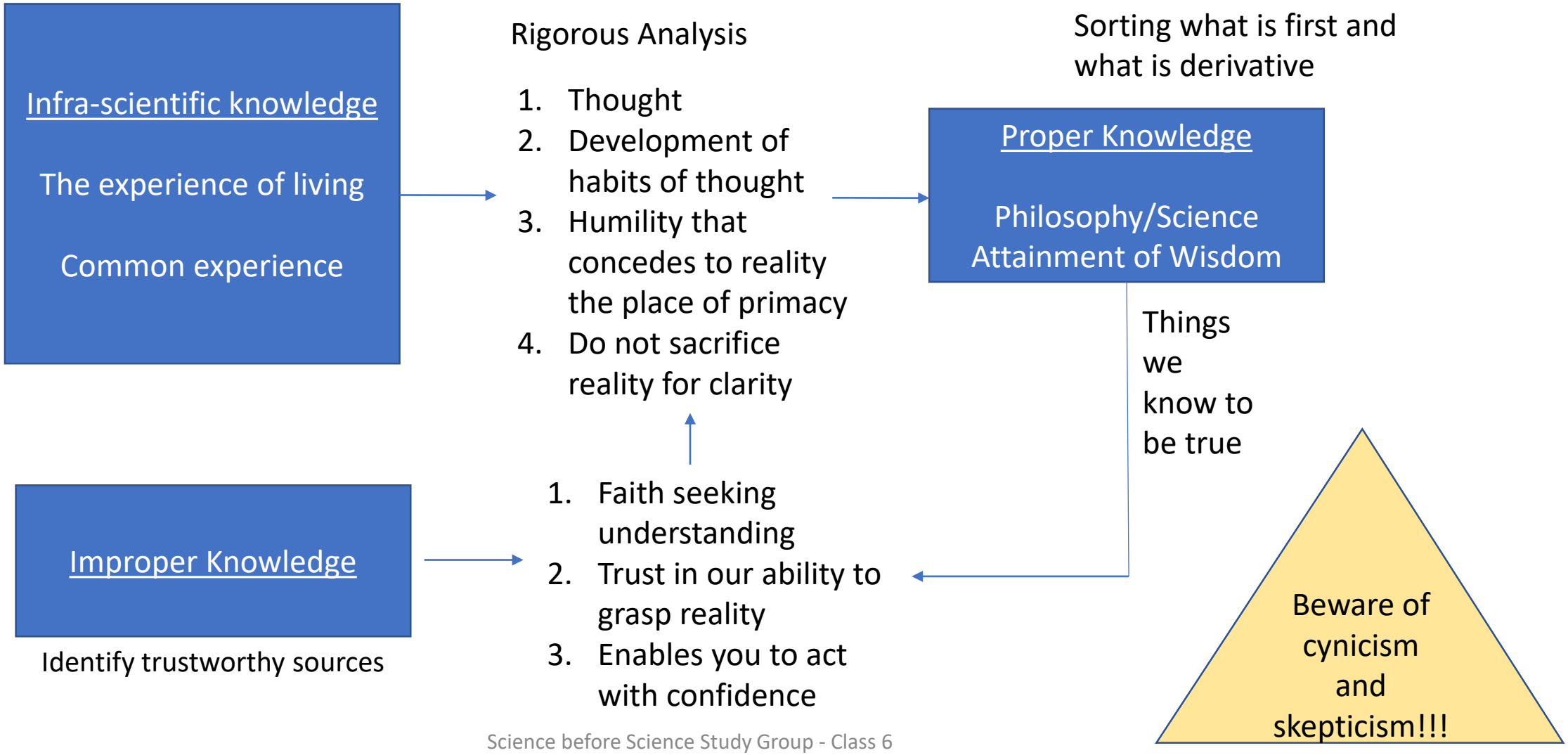
Chapter 1: Science without Wisdom



Chapter 2: A False Sense of Certitude



From Blind Belief to Proper Knowledge and Belief



Example of the danger

- Article in Physics Today by Mano Singham – science and evolution are undirected
  - Science in not directed toward the truth – valid science does not have to be true
  - Science is a cultural phenomenon – whim of scientists and not reality
- But most scientists enter science – fascinated by physical reality and want to understand it!
  - If they believed science was not about truth – there would be no new scientists to replace the current ones
- At first, students would hear one thing (not about truth) and act differently (based arguments as if there was truth)
  - But eventually students will adopt the beliefs of their teachers
  - Number of scientist would decrease – who wants to dedicate their lives to a game
  - Or science could be transmuted into a practical technology for the potential control over nature
  - But this wouldn’t be science!

Chapter 3: First Things First

Sensorial Knowledge comes first for us!

- Chapter 3
  - Sensorial knowledge is a real form of knowledge
  - Sensorial powers are limited
    - Can make errors
    - Can correct these errors
    - Senses are reliable and can give proper knowledge
  - Do not forget the primacy of the senses!!!
  - All material things are composites of potentiality (matter) and actuality (form)
    - True – because of the undeniable existence of change – not a trivial point – necessary
    - Physics is the study of changeable being

Chapter 4: What is Truth?

Realism versus Idealism - Significance of Gödel's Theorem

- Chapter 4 – Gödel's Theorem
  - Disaster for idealists – looking for truth in system on ideas
    - Only those who conceive man as an angel (Descartes, Kant) are grief stricken
    - Our minds are not the source of truth – reality is
  - Our knowledge from the external world through our senses
  - Ideas are that by which we know a thing not that which we know
    - Phantasms versus ideas; particular versus general
    - Idea of a nut-bolt fastener – if I take away the bolt – I abandon the idea of a fastener
      - Cannot chop an idea in half – it is immaterial
      - Idea of a circle is general; material things are particular
    - Extension is first accident of physical things
      - Ideas have no extension – can't take them apart- no such thing as half of an idea
      - Hence the intellect (substantial form of man) is immaterial
  - These facts are essential for science
    - If one thinks what he knows are his ideas – he is trapped inside his head
    - If one is convinced the mind is material – he must mistrust the mind
    - Cannot maintain your sanity in such a way of thinking
      - Nietzsche tried the "there is no truth" experiment and went crazy

Simple Timeline – Descartes, Newton, Kant

Rene Descartes	Isaac Newton	Immanuel Kant
b. 1596 – d. 1650	b. 1643 – d. 1727	b. 1724 – d.1804
Discourse on the Method - 1637	Principia Mathematica* - 1687	Critique of Pure Reason - 1781

Span of 144 years

The Dominicans – the standard bearers of the teaching of St. Thomas Aquinas and St. Albert the Great are almost gone by the late 1700's. The truth that our knowledge begins with the senses is lost. Rejected (and not set side by side with) and replaced with the powerful scientific method which comes to dominate our thinking along with philosophical idealism from this point onward to present day.

Full Title is Philosophiæ Naturalis Principia Mathematica

Further Lessons from Chapter 4

- We saw that the first thing we know is “there is an is”
  - Being is primary
  - Being is multileveled and univocal
  - Even logic references the being of things “this is that”
- All things are intelligible, in so far as they are
  - Intelligibility is *being* looked at from the point of view of understanding
  - The essence of a thing is made present by the idea of it
  - The form of the thing is freed by our intellect – one becomes the thing, one becomes conformed to the thing
  - Science presupposes these facts!
- Thinking is a multi-step movement to truth
  - We abstract the ideas from our phantasms
  - Then we make a judgement of what is what
  - Finally we reason; we link together propositions, look for commonality among things and come to conclusions
  - This process is implicit and spontaneous
    - People who usually seek and live the truth are known to have common sense
    - People who do not skirt obvious realities in the name of systems thinking
- Two ways of looking at things
  - Rough common sense – look for commonality, sort of averaging
  - Refined common sense – look for the essence of things – proper knowledge
  - Science depends upon the latter

Truth

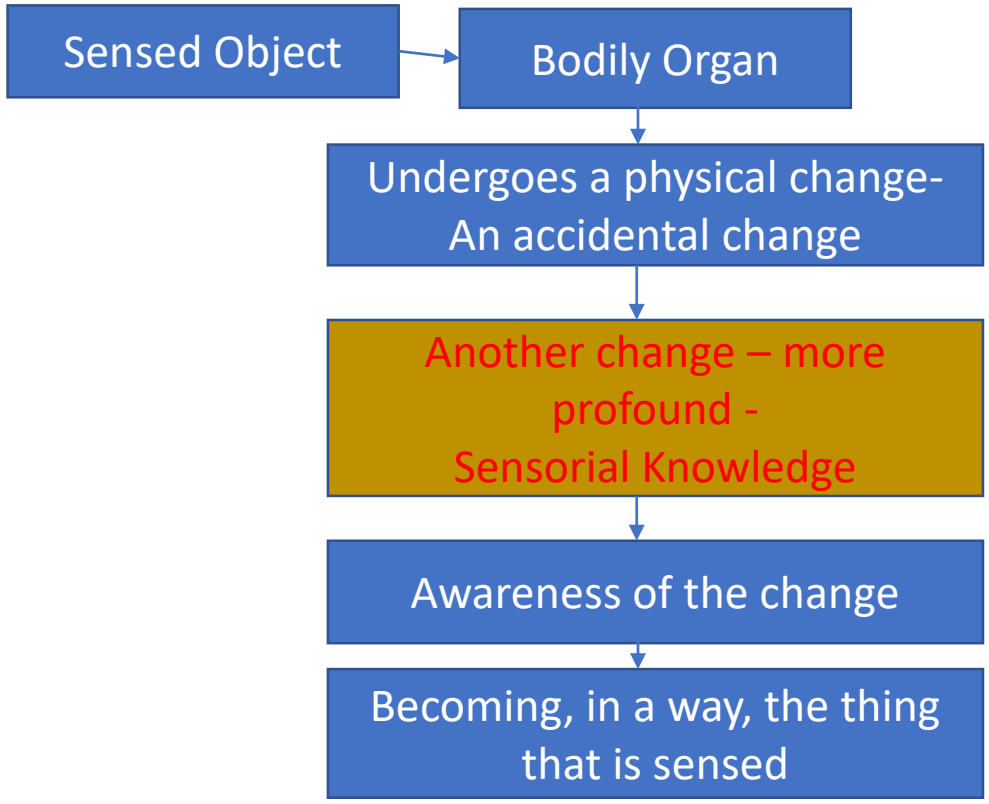
- Truth is the conformance of the mind to reality
  - Gödel's theorem's points to the radical connectedness of reality
- Being is an ocean – a mystery
- Being is primary – not a choice we make
- It is so huge we need to look at it from different directions
  - The transcendentals
- *Being is* to the extent that it *is one* – more unified the more intelligible
- All things are true to the extent that they are – they have an essential form that can be received by a knowing mind
- Potential relation for me since I don't know everything
- Must be relation to a knowing mind
- Principle of Sufficient Reason – must have reason in itself or in another
- Actually leads us to St. Thomas' 4th proof of the existence of God
- Perfect conformity to reality - Truth

Lessons from
Chapter 5: On Animals, Men and Robots

- We looked at differences between animals, men and robots
  - Animals have sensorial knowledge and nutritive life
  - Men is a rational animal
  - Science needs these conclusions!
  - In psychology need to know difference to avoid errors
    - Animals and men are not degrees of the same thing!!!!
    - This error can lead to wild things
  - Science needs to know that animals have sensorial knowledge and men is rationa and has intellectual knowledge

Returning to Sensorial Knowledge

Sensorial Knowledge



Like the change we have been talking about

Bodily organ experiences a physical change (but not conscious of the change)

Apprehend the form of the thing sensed

Power of Sensation

Puts in conscious presence

Receives form in a unique way

Becoming the thing sensed

Without changing in ordinary way

In part an immaterial power

Shocking!
Unavoidable!
The core of Sensorial Knowledge

Dangers of Errors

- Man is just an animal with greater intelligence – a matter of degree and not of kind
  - So where do we draw the line? Increase scale for animals or decease for man.
    - In giving rights to animals?
    - Or, in treating humans as animals – since we are on the same scale
    - Where do mentally handicapped persons fall on this scale?
    - In not treating animal as food or in treating man as food?
    - In doing research on animal and doing research on men – like the Nazis?
      - Embryonic stem cell research?
      - Experimentation with fetuses?
- Physicalists – Nancy Murphy – supposedly Christian philosopher
  - Man doesn't need a soul anymore – we are more advanced
  - But man is special but doesn't have an immaterial part to himself!
  - It's his level of complexity! The complex makeup and the complex boundary conditions.
  - We don't have (yet) a neurobiological explanation for consciousness – so there are still some problems – she admits
  - Denies that her totally physical man is subject to reductionism (i.e. govern by physics acting on its parts) and says it is consistent with the Bible
- What about robots – what limits? What determines

Lessons from
Chapter 6: Galileo versus St. Thomas

- Profound differences between the sciences (wide sense)
  - Pure, Applied and Methodological
  - Pure – physica, mathematica and metaphysica
  - Necessary for the specialized sciences to
    - Know their limits
    - Locate where their foundational principles come from
    - If not, scientist will view world as *empiriological*
      - *Believe the world is only empirical data and logical constructs in their heads*
  - Scientists (who do not understand the science before science)
    - Experimentalist – tend to be materialists – not believing in the immaterial
    - Theoretician – tend toward Platonism and ideas (immateriality) only reality
    - Scientists never fully aware of this dichotomy – resolved only in Thomas-Aristotelian philosophy – talking only pragmatically (or heuristically)
    - Error of thinking that all is empiriological – take root in others (non-scientists) – that take it seriously
    - Come back to scientist as subjectists – using his arguments against science

Lessons from Chapter 6 (continued)

- Importance of Culture
  - Must be imbued with truth
  - Necessary to have a healthy soil (for activities such as science)
- Remember
  - We depend heavily on our improper knowledge in advancing our proper knowledge (Chapter 2)
  - Most of our knowledge is improper – that we get from those around us and the culture
  - If culture feed us lies – lead to despair about knowledge
- Anti-Catholic prejudice had hidden – that the Catholic culture did not stifle science
  - If fostered, protected and finally provided Galileo with the education, information and technology he needed to crown the scientific advancement of the middle ages.
  - To forget this cultural inheritance can be catastrophic
  - Ingrained cultural beliefs that keeps us following the logic of erroneous principles – having a corrosive effect on society

Lessons from Chapter 7: From the Big Bang and Time Travel to Evolution

- What if modern science was the base and center of our thinking?
  - Modern thinking has no awareness of the division of sciences
    - Based on level of abstraction
    - Based on pure, applied and methodolgical
- Here we looked at six cases of the empiriological and tries to understand philosophically
- Taking modern science as fundamental – we end up adopting Kant's philosophy
  - Remember he was justifying Newtonian empiriometric physics
  - He was living Gödel's theorem – we couldn't know anything
  - Leaves Newtonian physics without a basis!

Cultural Atmosphere of Catholic Europe

Philosophical understanding in the culture

1. The world exists independent of us and is orderly
2. We can understand it
3. The world is good and thus we should have no aversion to observing and working directly with the material world
4. The world is not necessary

- Galileo and Newton used Thomistic principles

Lessons from Chapter 7

- Newton understood the limited nature of his theory: giving a *mathematical notion* without considering *physical causes*
- Newtonian physics – some considered inertia (impetus) as motion not needing a cause
- Medievals understood inertia at a deep level
  - Surpassed Aristotle (e.g. Philoponus and Buridan)
  - Viewed world is non-necessary – no cultural push-back from cultural
  - Sky is not domain of the gods
  - Universe as a whole – rationality of all things – truths only implicit in Aristotle
    - Necessary for Newton in treating motion of planets and bodies on earth with same understanding

…. Chapter 7

- Profoundly irrational positions
  - QM – something is not there when one is not looking at it
  - Bell's Theorem – simple but fallacious ontological interpretation of the empiriometric – we must give up on the reality of things or acknowledge action at a distance occurs
- Neglecting ontology
  - Alan Guth: "The entire universe burst into something from absolutely nothing – zero, nada. And as it got bigger, it became filled with even more stuff that came from absolutely nowhere"
  - Irrational in two ways
    - Something comes from nothing
    - Cannot argue from existence at one point to complete non-existence at some earlier point – thus you cannot prove the beginning of the universe
  - Says nothing is really something
    - This ambiguity is required to maintain error
- Showed other examples of empiriological/ontological explanations
  - Examples of how to think about these theories ontologically

Chapter 8: The GOD Chapter

- To deny God we must deny foundational truths that science rests on
  - Can avoid making understanding of His existence explicit – if we keep the first principles of science implicit only – never acknowledge directly
- Being is the proper object of the intellect
  - Metaphysics is the study of being as being
  - Metaphysics is the first philosophy
  - Transcendentals – being under its different aspects - being, true, good, one, reality, identity – is the prime intelligible
- Maritain (great 20th century philosopher)
  - Being wrapped up in the data of the senses
  - Intellects 'loops the loop' between the metaphysical/transcendental and report of the senses
  - Metaphysical concepts can be realized without matter
  - This suprasensible cannot be the object of experimental science but of another science
  - Knowledge ordered to such a universe of intelligibility is most certain even though we find it difficult to acknowledge it
    - For we are an ungrateful and mediocre race

St. Thomas – Five ways to demonstrate God's existence

- First – based on fact that all things change
- Second – based on that things need a cause
- Third – based on possibility and necessity
- Fourth – based on degrees of intelligibility
- Fifth – based on the order of things

All of these proofs contain the fundamental science that we have learned in this course

God and the Universe

- Now see that God can do all the things needed in previous chapter
- Matter is the potentiality in the physical universe
  - World is unity of form-matter composites
  - A radically interconnected, interdependent world
- Universe is not God; it is not necessary
  - Rules out pantheism – many false starts for science
  - Universe is not Pure Act; neither pure intelligibility or unity or intellect
- Man is greater than the universe – he can contain the entire universe in his mind
- Could God have created a different universe (Einstein)?
  - No there is no compulsion; yes he could have
- Why did God create?
  - Nature of being (goodness) is to be diffusive of itself. The nature of goodness is to give
  - Good man is recognized by his magnanimity
  - God creates because that is the way goodness is. Goodness is diffusive of itself.

He Is who IS

- God's essence must be His existence – otherwise it would be possible for Him to not exist
- God is He who Is
- More than one God?
  - No because immaterial things only distinguish themselves by their essence
  - If their were two Gods – for then to be different one would have something the other did not which would mean the other would not be God
- Pre-scientific consideration of proofs are done spontaneously
  - John Wheeler – why does the universe fly??
  - They come across the fact that the existence of the thing is not in the idea of it

Mathematical Morality

- The applied science of ethics – also called morality
- “What should I do?”
- “There is no absolute answer – all things are relative – indeed, no one should impose his morality on another”
- Steven Weinberg said – ethics is unlike science – there is no way to determine what is right

Chapter 9: A Mathematical Morality?

- God is our ultimate end
  - If not, we are left with no ground for our actions
  - If not, we are left with willing our own happiness which makes no sense if we have no final end
  - To extent that God is not our end – we have disorder in our lives – irrationality
  - Empiriological becomes our last end, our god, that for which we live
  - If taken seriously, man becomes means for an end of the powerful; deprived of the dignity of human beings
- Modern science – respect for the truth
  - Discovering reality – truth
  - Remember the severe problems that arise when it is loosed from its proper setting

Nothingness of the Atom

- Atoms are mostly ‘empty space’; we must conclude that we are mostly nothing
  - Implicitly assumes we know atoms before we know ourselves
  - We must start with what is more known and proceed to what is less known
  - Scientists think about the atoms and not about all the thing that allow them to assess and deduce the existence of atoms
    - We cannot sense atoms; no one has seen or heard an atom – so we must learn about them through things we know directly
  - Concept of “mostly nothing” is an empiriometric one and does not apply to being
  - First accident of things is quantity the second is quality
    - One cannot stick atoms side by side and get a man
    - Reductionism is helpful in its proper place – but it is not ontology
    - You cannot understand man by understanding an isolated atom!
    - Man is not a stack of atoms

Nothingness of the Atom (con't)

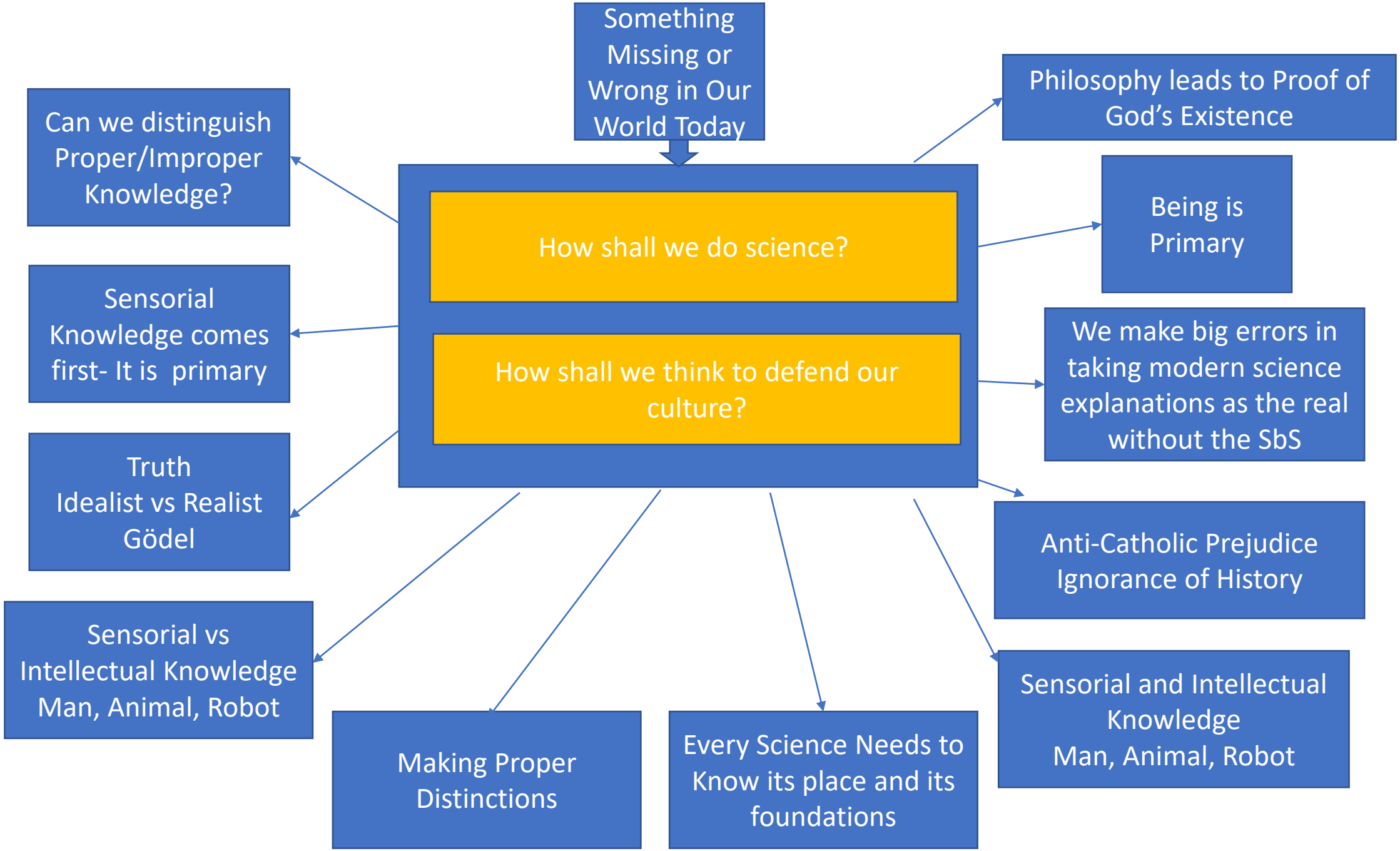
- How do we know atoms even exist?
  - Dalton was first to observe that elements always combine in small whole number ratios – atoms – periodic table
  - Rutherford postulated the structure of the atom from experiments with alpha particles – small heavy nucleus
  - Interaction between charges – there is something not nothing between electrons and nucleus
  - Quantum electrodynamics further evidence that the space is not empty
  - In short – there is a lot there! Not emptiness.
  - Atoms interact – e.g. hydrogen and oxygen to water – still virtually present – but water has different properties
  - Atoms take on new level of being when present in higher beings

How to do science?

- Keep in mind *physica* is larger than empiriometric science
  - Knowledge is about reality not about knowledge
- Replace implicit philosophical basis with an explicit, sound and thought-out one
  - Correct philosophical understanding will also keep one from trying to force ontological considerations into an empiriometric theory
  - Explicit philosophical underpinning greatly changes what one does with the empiriological work after it is completed.

The Love of Wisdom

- Philosophy can save us from mistakes
- But philosophy is love of wisdom – is love of Truth
- To access truth – one must conform to reality
- It needs a certain stillness – its profound
  - Like staring at a beautiful sunset
- Our culture – impatient and busy – widespread ignorance of sound philosophy
- Men have not submitted their minds to the literature of St. Thomas
- Closing statement
  - “we see that the science before science is indeed so. We deny it at the peril of the second science, modern science, and our own happiness”


Something Missing or Wrong in Our World Today
How shall we do science?
How shall we think to defend our culture?
Can we distinguish Proper/Improper Knowledge?
Sensorial Knowledge comes first- It is primary
Truth
Idealist vs Realist
Gödel
Sensorial vs Intellectual Knowledge
Man, Animal, Robot
Making Proper Distinctions
Every Science Needs to Know its place and its foundations
Philosophy leads to Proof of God's Existence
Being is Primary
We make big errors in taking modern science explanations as the real without the SbS
Anti-Catholic Prejudice
Ignorance of History
Sensorial and Intellectual Knowledge
Man, Animal, Robot