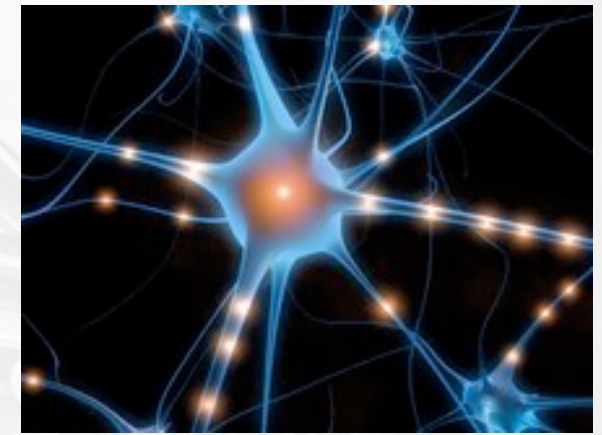
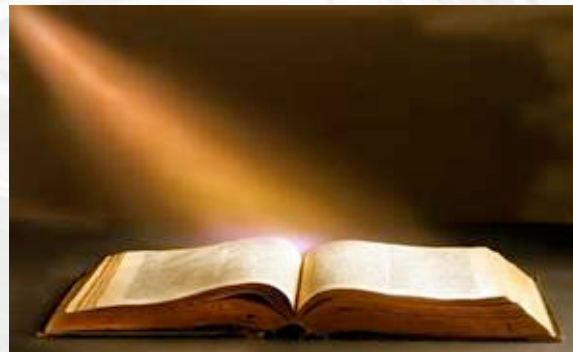
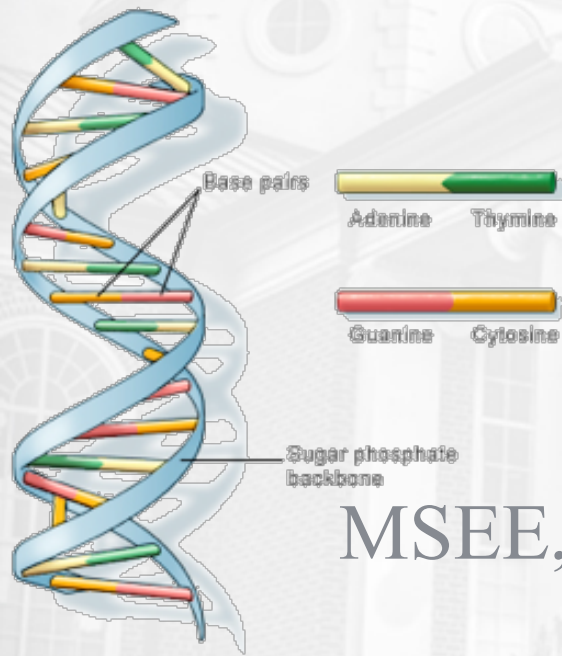


Exploring the Application of Theological Method in Genomic Research

ASA 2016 Conference

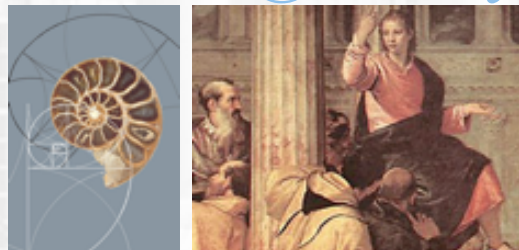


Jim Johansen

MSEE, MASR, MACA, PhD (Candidate)

July 23, 2016

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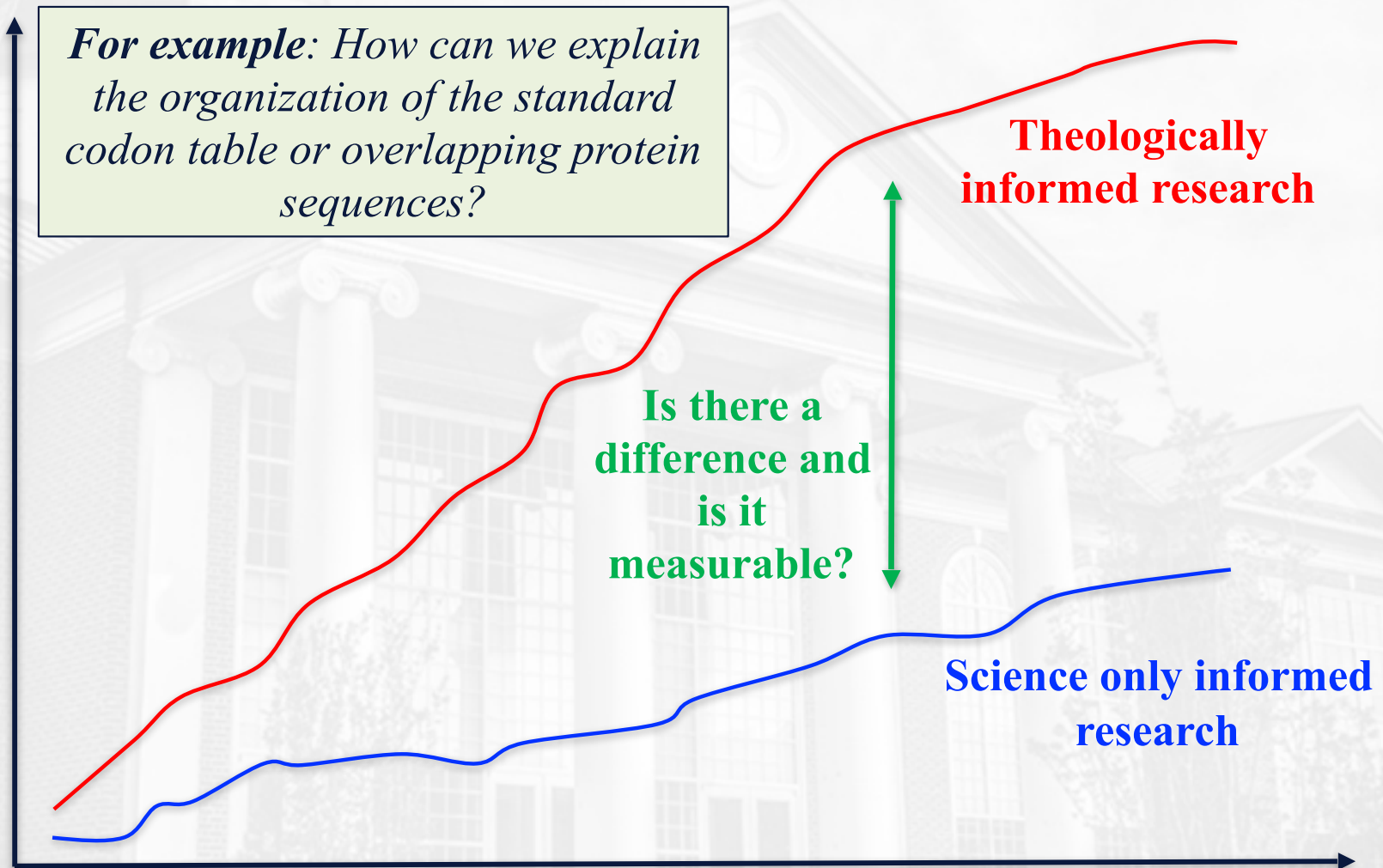


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UNIVERSITY

Overview

- Briefing represents work for my dissertation planning
 - Peer review is desired
 - Dissertation committee will contain faculty PhD experts in 1) theology, 2) apologetics, and 3) genomics
 - Other interested parties (formally or informally) can be included
- This presentation will explore two main themes
 - **Part 1** - How theological insight and methods can be applied to science: i.e. “applied theology”
 - **Part 2** - Explore a specific scientific area for application: the nature of genomic information
- Goal - summarize the main points and to seek collaboration, follow up dialogue, and discussion
 - There is extensive information in the brief, only highlights and select examples will be discussed
 - The use of “roadmap” charts and graphics are used to help the reader navigate through the material

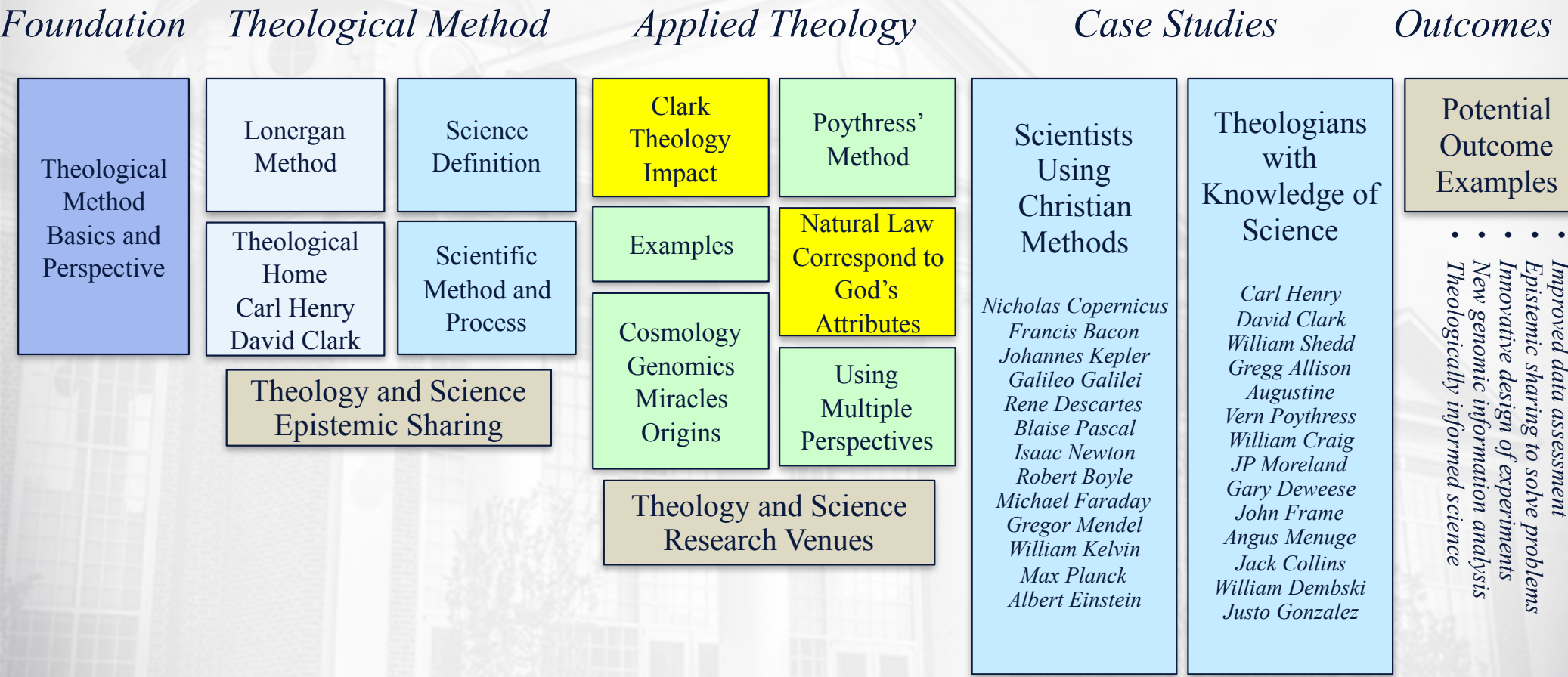
Idea: Characterize Impacts from Research Method Differences via a Genomic Research Problem



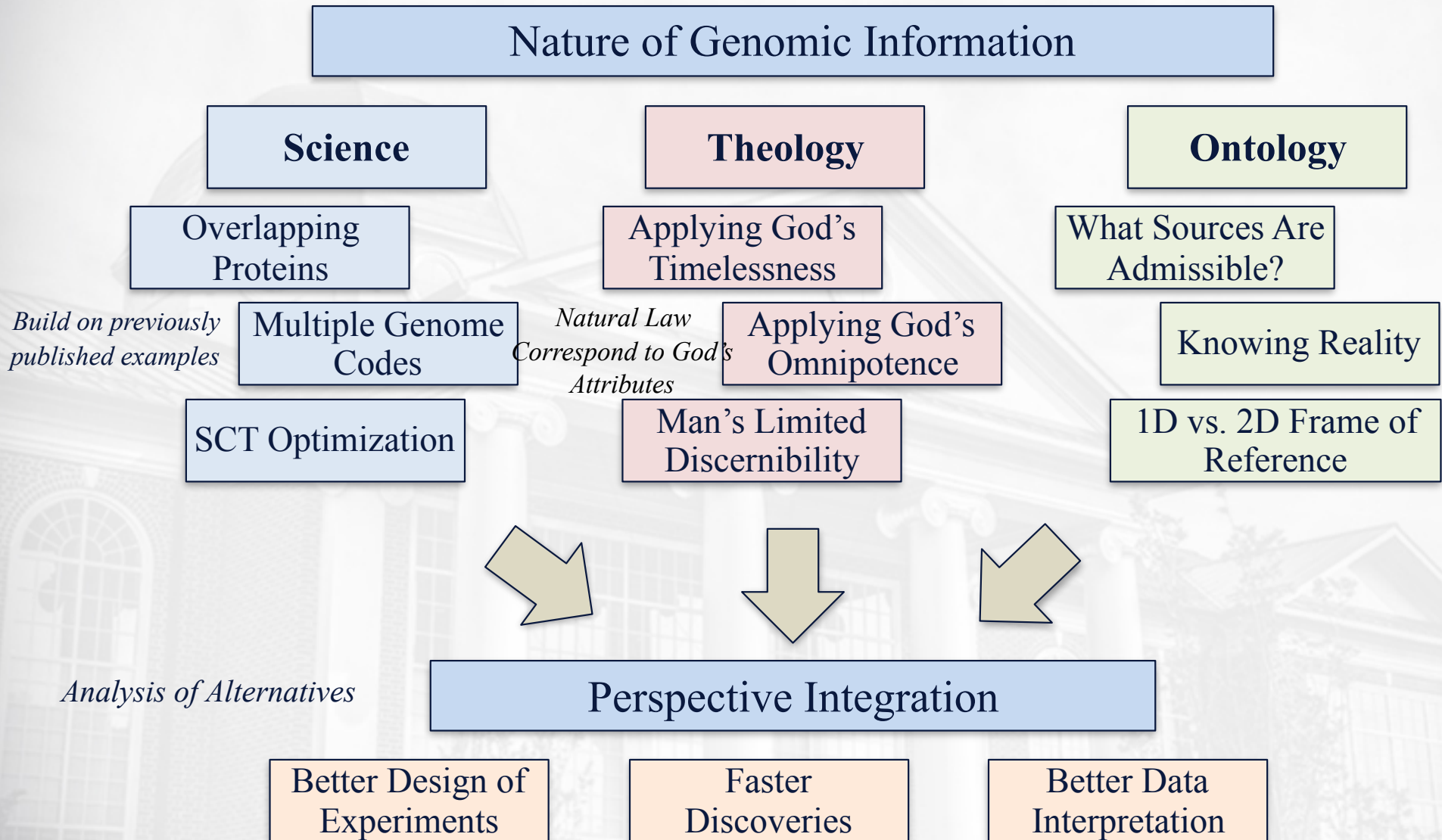
Part 1: Theological Method in Science

Theological Method in Scientific Development

“Applied Theology” - Theological Method Development and Application

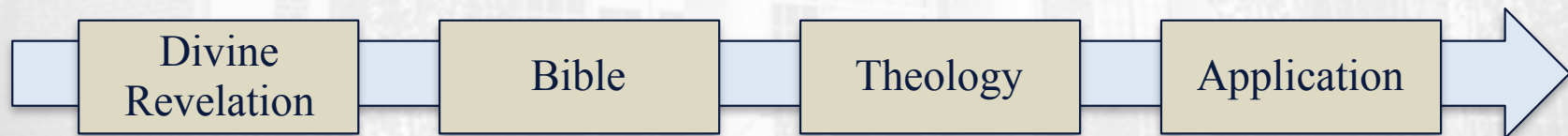


Part 2: Nature of Genomic Information

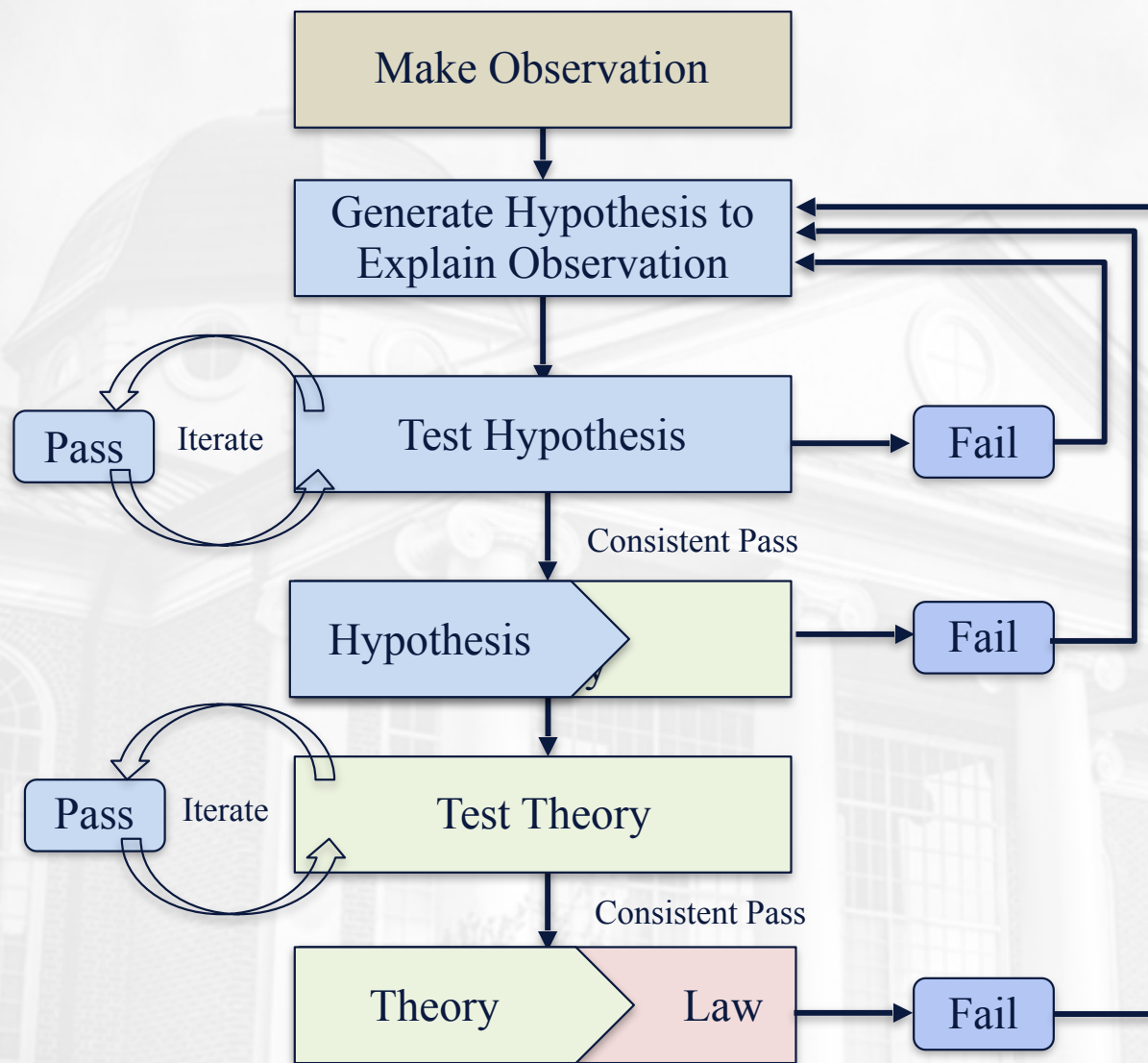


Theological Method

- Similar in philosophical concept to the scientific method, **theological method defines the approach one takes to study theology and to make determinations on the nature of God, ultimate source of truth, Divine authority, and an assessment of biblical content**
- **Defining a structured theological process enables an individual to explain to others how their theological analysis is a rigorous process that can identify objective truth**
 - The realm of truth extends beyond empirical data from measured results
- A general theological method is not as common as the ubiquitously used scientific method
 - Divine revelation is given and there is a direct examination of this information
 - There are different views on the authority of Divine revelation

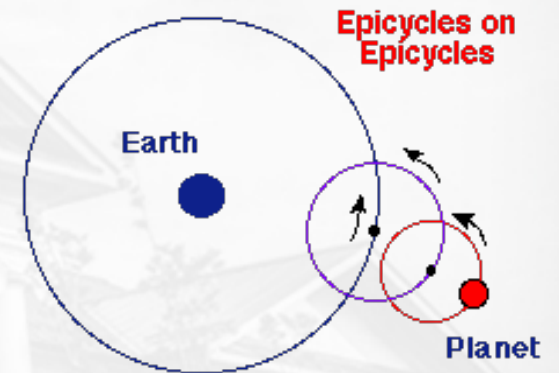


Scientific Method and Process



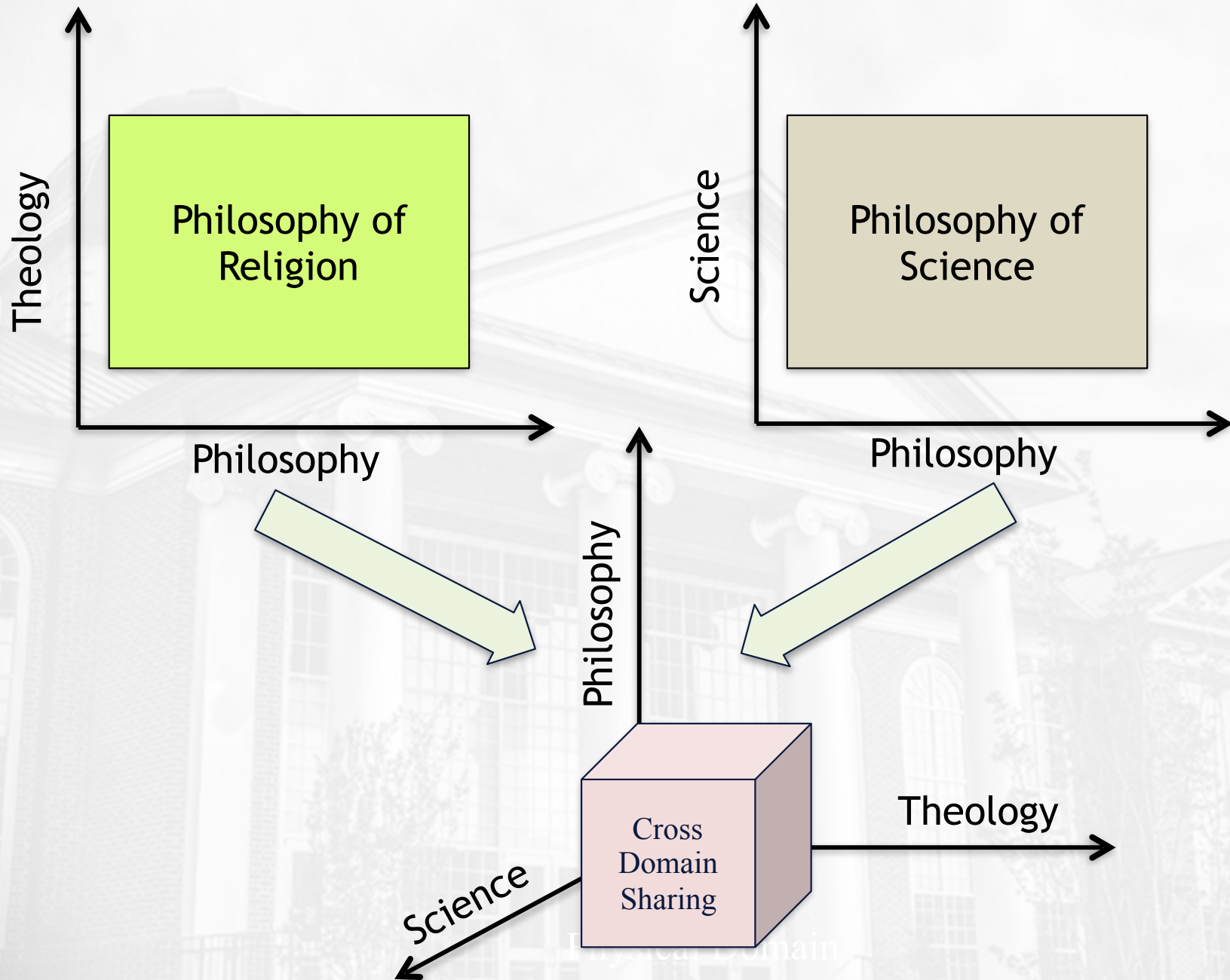
How do we know if this is happening?

Ptolemy epicycle corrections for Earth centric astronomy

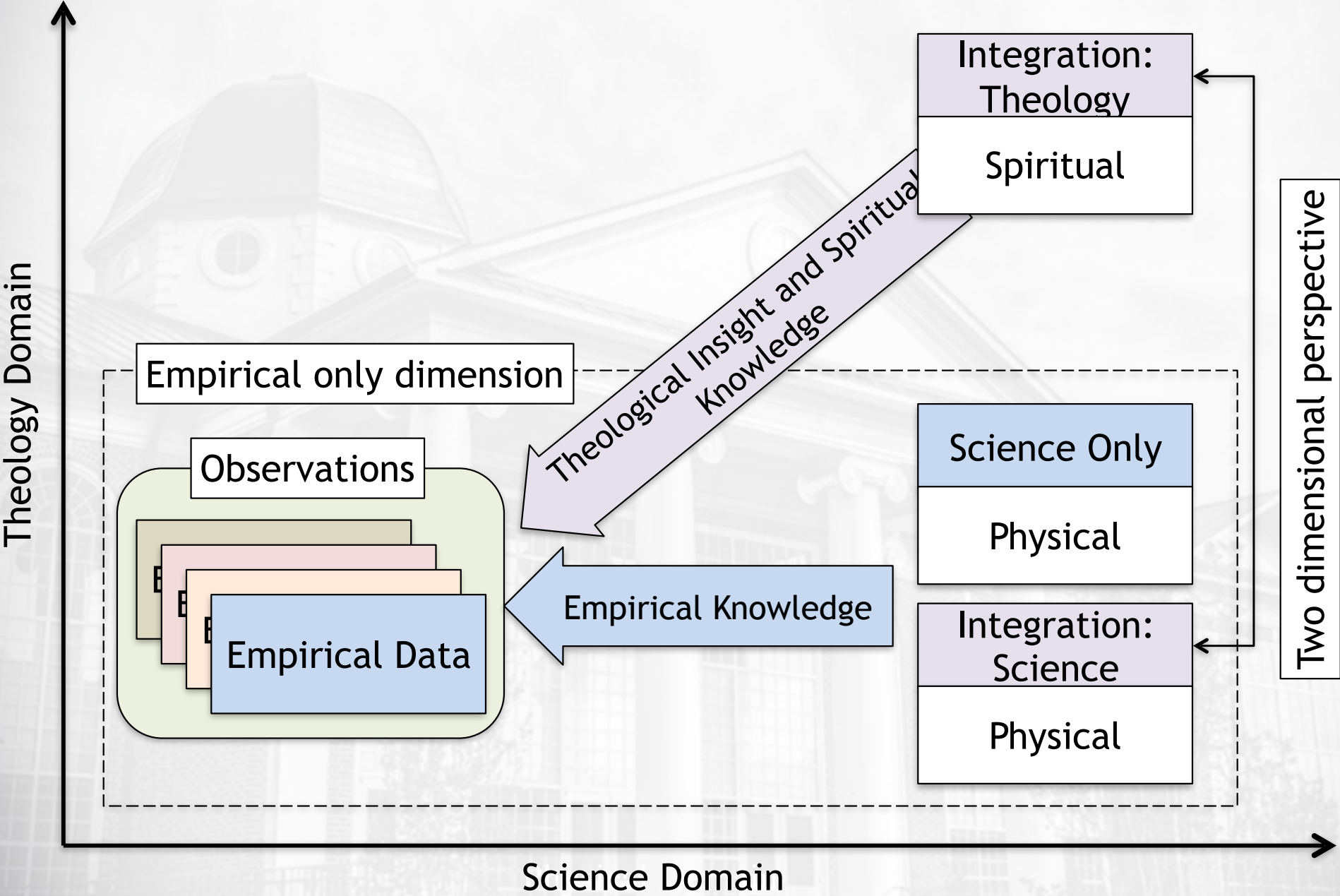


The use of epicycles was a geometric model used to explain the variations in speed and direction of the apparent motion of the Moon, Sun, and planets.

Integrative Perspective (1 of 2)



Integrative Perspective (2 of 2)



Domain Sharing Impact

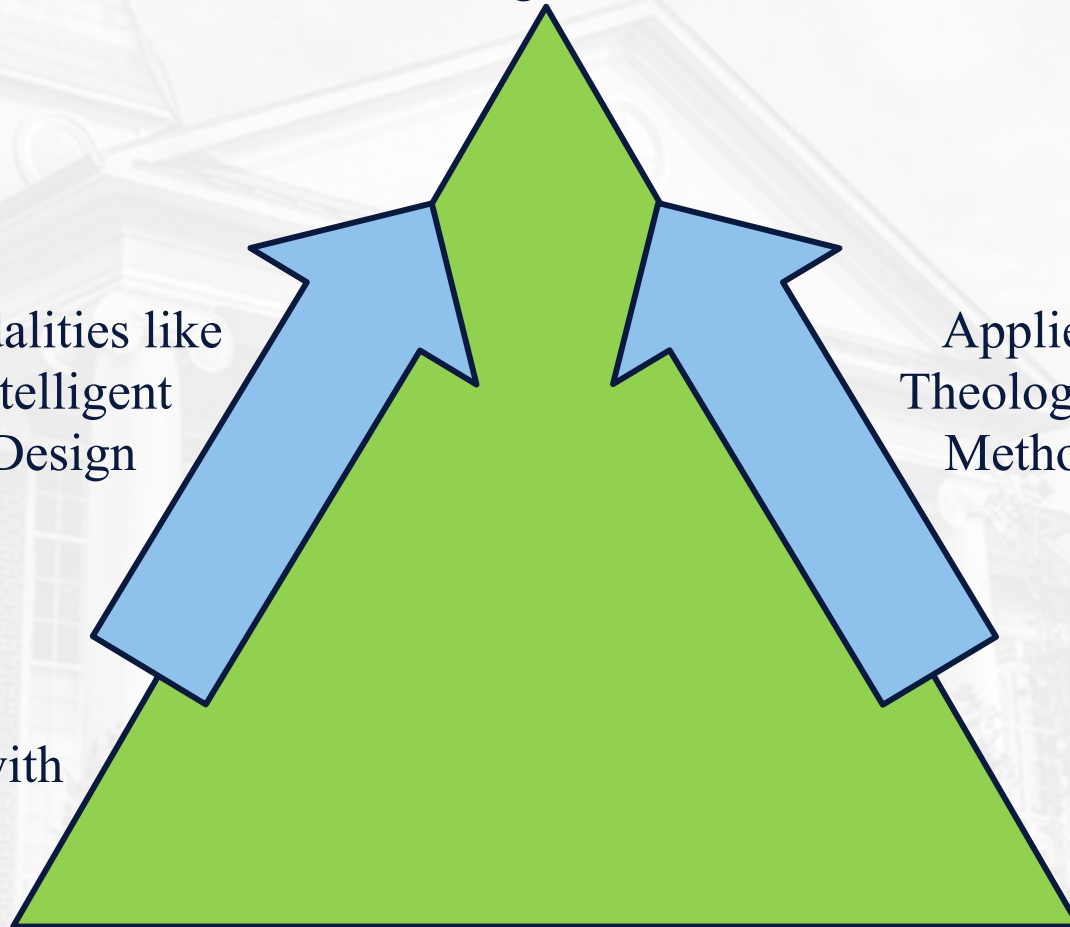
Science and Theology
Integration

Modalities like
Intelligent
Design

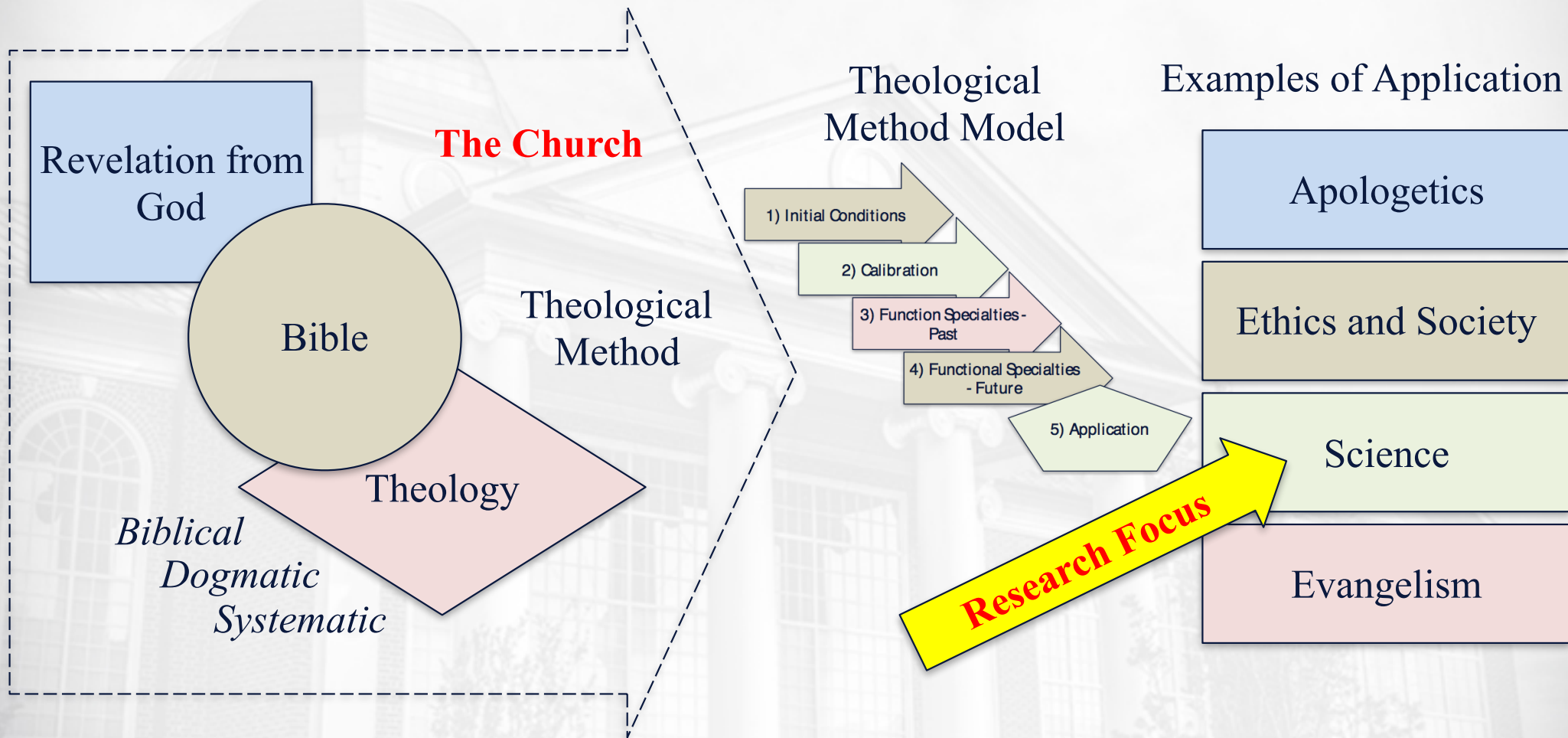
Applied
Theological
Method

Scientific Method with
Methodological
Naturalism

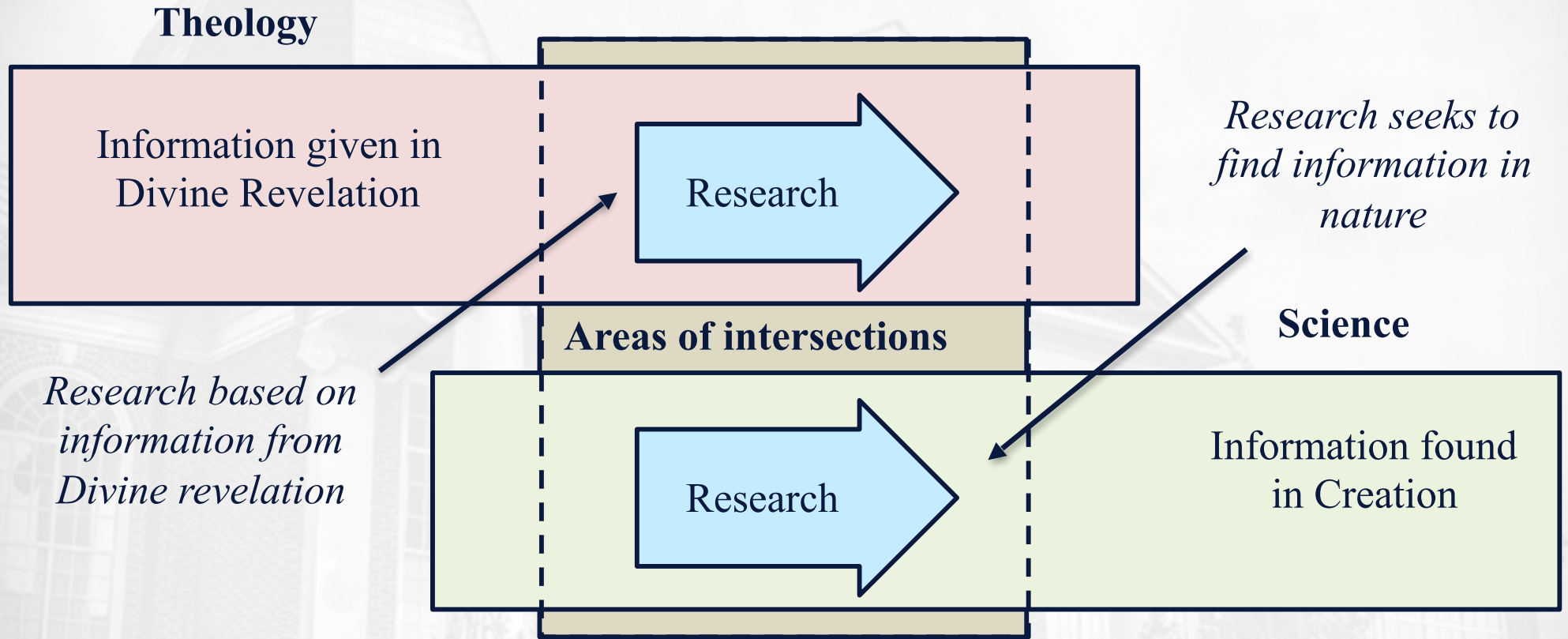
General
Systematic
Theology



Process of Applying Theology



Theology and Science Research Relationship



Theology Contributing to Science

- Clark offers five assertions how Christian theology can contribute to science
- 1) Christian theology gives an explanation of **why the universe is orderly**, why it is prone to mathematical interpretation, why it exists, and, why its existence makes a difference
- 2) Christian theology provides a **metaphysical foundation for the rational justification of science**. Theology explains why natural science is achievable as a rational endeavor
- 3) Christian **theology explains why science makes a difference**. Christian thinking reasons for the fact that we conclude the knowledge gained through science is valuable. Science is a value filled activity
- 4) A growing subgroup argues **theology can speak to science by directing future research**. This goes past offering metaphysical, rational, and axiological grounds for science
- 5) Christians might use **what they know theologically to assist in assessing one scientific theory over another**. Consider a situation where scientists evaluate two incompatible models, both of which appeal to and account for substantial portions of the same empirical data. Theology can help in this area

Vern Poythress' Integration Method

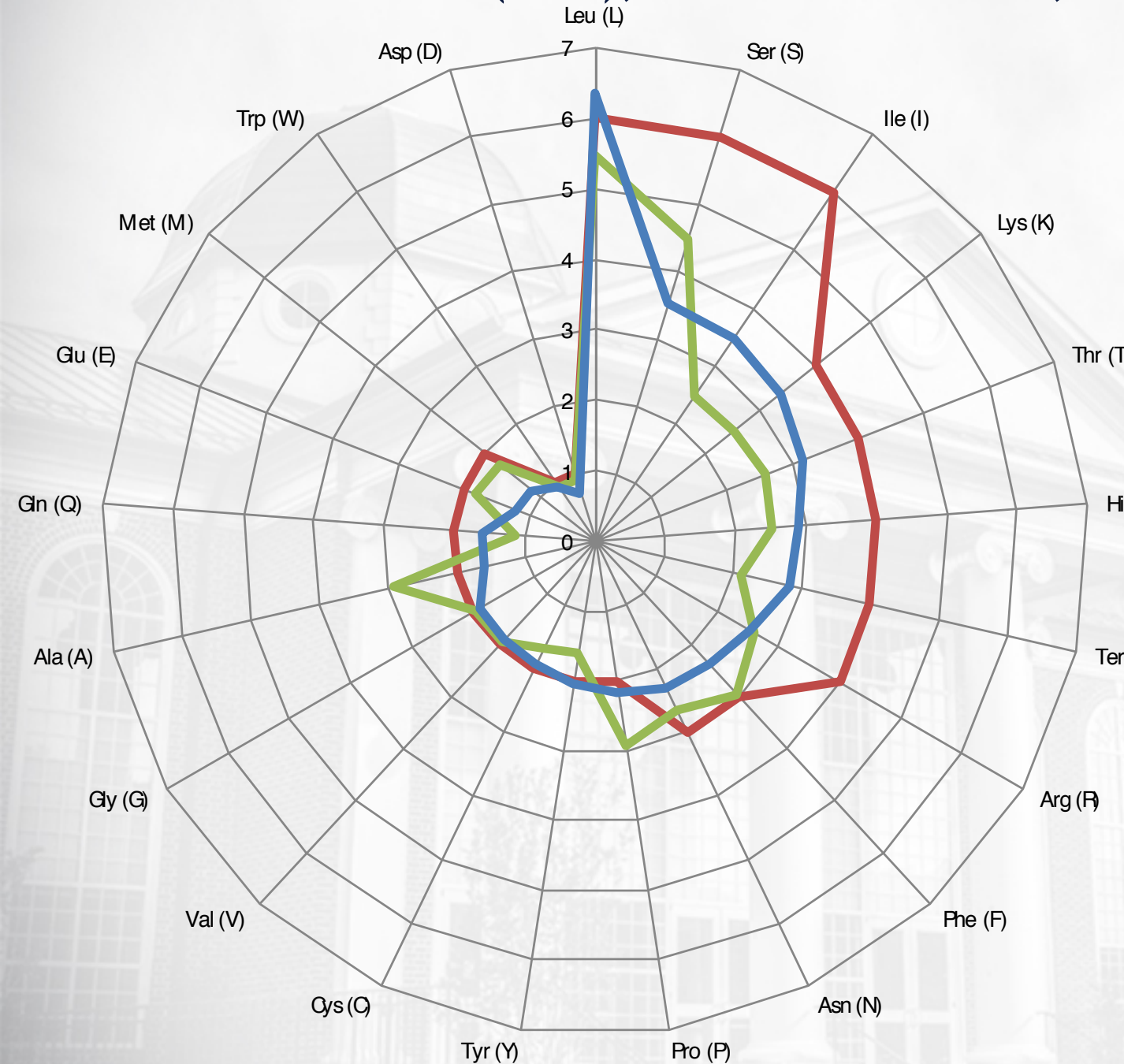
- Poythress with a PhD in Mathematics, from Harvard University and a DTh in New Testament, from the University of Stellenbosch (South Africa) is an example of disciplines working together synergistically
- Three characteristics of **natural law correspond to attributes of God**
 - 1) **God is omnipresent**, present in all locations
 - 2) **God is immutable**, He does not change
 - 3) **God is eternal**, present at all times. It is not an accident that these three attributes of God are mirrored in scientific law
- Poythress discusses perspectives in theological research and methods in his book, *Symphonic Theology*
- Everyone has a unique perspective
 - People have different interests and notice different things about an object or situation.
- There are interesting & useful **parallels between God & scientific law**
 - In a biblical worldview, **God is above time** - not being subject to confines of finite individual involvement of time, and **God is in time** - acting in time and intermingling with the subjects in His created world
 - Natural law is **above time in its universality, but in time through its applicability** to each individual occurrence

Filtering Analysis

- **Explanatory filter** – how well does the current theory perform?
 - How well does the current approach explain the data?
 - What assumptions are required to make it valid?
 - What alternative theories exist?
 - What is not explained?
- **Domain filter** – should the scientific method be augmented with theological method?
 - Can we determine if the theory is reality or just a well thought out hypothesis?
 - If things are not explained does theological method help?
 - What possible sources of truth, knowledge, information, and insight could help?
 - Biomimicry – leverage nature design techniques
 - “Theomimicry” – notice theological principles in nature
 - Symphonic filtering methodology - Assessment of Scriptures that follow a particular theme
- **Sensitivity filter** – what are the principle components to look at?
 - Functional decomposition – what are the major elements to analyze?
 - Principle component analysis – what is the most significant element that should be focused on?
- **Characterization filter** – what known signatures are present?
 - What “design pattern” or template concepts should be recommended for analysis and design of experiments?

Comparative Frequency Count Plot of Amino Acids: Standard Codon Table (SCT), Human Genome, & Specific Gene

There appears to be a correlation between codon and amino acid frequency and the SCT table layout to create artifacts like greater error tolerance

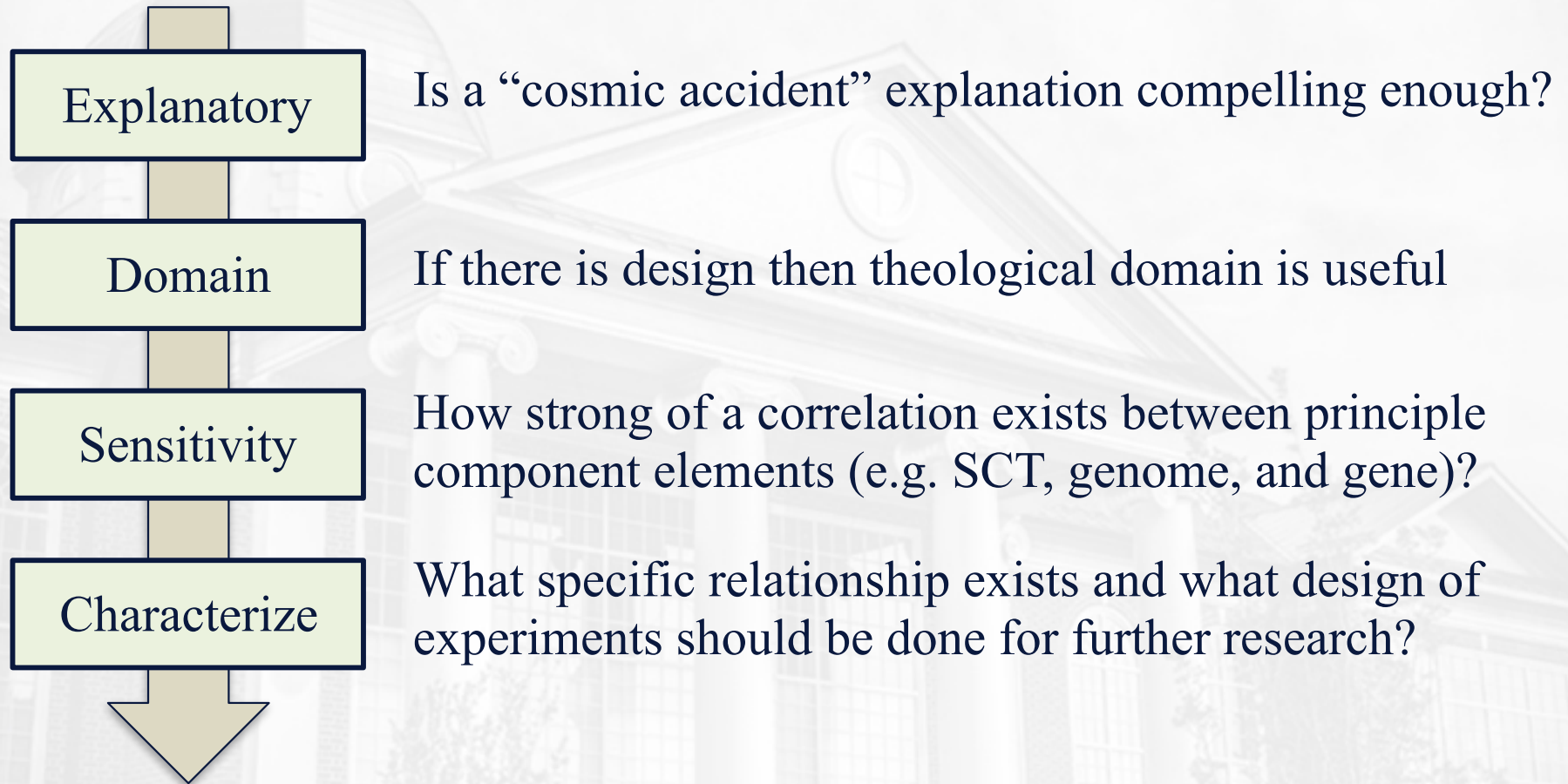


— SCT Codon Count
 — Scaled Gr16 Freq
 — Scaled GrCh37 OMGFreq

Standard Codon Table

	T	C	A	G
T	TTC Phe (F)	TCC Ser (S)	TAC Tyr (Y)	TGC Cys (C)
	TTA Leu (L)	TCA Ser (S)	TAA Ter	TGA Ter
	TTG Leu (L)	TGG Ser (S)	TAG Ter	TGG Trp (W)
	GTT	CCT	CAT	CGT
C	CTC Leu (L)	CCC Pro (P)	CAC His (H)	CGC Arg (R)
	CTA Leu (L)	CCA Pro (P)	CAA Gln (Q)	CGA Arg (R)
	CTG Leu (L)	CCG Pro (P)	CAG Gln (Q)	CGG Arg (R)
	ATT	ACT	AAT	AGT
A	ATC Ile (I)	ACC Thr (T)	AAC Asn (N)	AGC Ser (S)
	ATA Ile (I)	ACA Thr (T)	AAA Lys (K)	AGA Arg (R)
	ATG Met (M)	ACG Thr (T)	AAG Lys (K)	AGG Arg (R)
	GTT	GCT	GAT	GGT
G	GTC Val (V)	GCC Ala (A)	GAC Asp (D)	GCC Gly (G)
	GTA Val (V)	GCA Ala (A)	GAA Glu (E)	GGA Gly (G)
	GTT	GCT	GAT	GGT
	GTC	GCC	GAC	GCC
GTA	GCA	GAA	GGA	
GTG	GCG	GAG	GGG	

SCT Filter Assessment Example



Information Analysis with Theological Method Considerations

- Questions for scientific experimental results
 - Where did the **information come from**?
 - What is the **information content**?
 - **How** should the information be examined?
 - What does the information analysis **results mean**?
 - What **organizational principles** can we make from the information analysis?

Proposed Integration Questions

- How historically has theological method aided science?
 - Presuppositions, infer design, uncovering what God made discoverable, theologically informed observer looks for beauty, design, and form
- Does including theological method in scientific research produce better results?
 - Helps set up how one can think about problems. Theology helps one know one's biases and limitations humbly before God
- Can integration resolve scientific challenges & theological mysteries?
 - Science: realize we cannot know it all
 - Theology: create a frame of reference for the physical world. The Word became flesh (infinite) and dwelt among us (finite).
- How should we characterize an infinite God engaging with finite humans?
 - Understand we cannot know it all. We can only know it part. The evidence we can detect and understand is only partial
- What theological method tools are useful for genomic research?
 - Perspective, foundation, anchors, hermeneutics, and interpretation
- What genomic research innovation can be done via integration?
 - Improve initial conditions for experiments, suggest new research

Potential Outcomes Being Investigated

- Improved data assessment ability via an integrative science and theology frame of reference
 - **Metric: compare science to science plus theology**
- New science and theology sharing to support solving complex problems
 - **Metric: explore examples of hard problem, focusing on genomics**
- Innovative design of experiments that are influenced by theological and scientific methods
 - **Metric: objectivity, how best to interpret and iterate on results**
- New genomic information analysis and functional evaluation tools and approaches
 - **Metric: assume there is design, quantify what does the data tell then?**
- Greater insight into theological truths via theologically informed scientific exploration
 - **Metric: Infinity and unknowns are okay**

Summary

- Summary
 - **Argument**: Theological method is useful in science
 - **Filtering** can help define when it should be applied
 - Information analysis can look at the impact is while using both domains
- Impact
 - Coming to unjustifiable conclusions are serious matters
 - Seek ultimate truth
 - Discover deeper truth and understanding rather than just a more refined self-consistent standalone theory
 - Uncovering **new experimental findings may require new methods** to more fully understand reality
 - May require us to humbly accept we cannot know it all



Back Up Charts

Nature of Theological Inquiry

- Theological inquiry is said to differ from the natural sciences in the way it relates to our personal anxieties and hopes
- The scientist pursues his studies, it is asserted, with cool, detached objectivity, whereas the reality of God cannot be contemplated apart from our own interest and commitment
- Without question, our **contemplation of God involves us in a range of experience beyond that of impersonal physical relationships, and brings into purview such concerns as eternity, spirit, sin, life after death and much else.**
- **But scientific study is by no means wholly detachable from one's understanding of life.**
 - For example, without basic honesty in reporting experimental results, scientific research would be wholly unfruitful. And are man's personal fortunes and anxieties as wholly marginal to scientific inquiry as has often been presupposed?

Theological Home

- Evangelical theology encourages scholarly quality since it must address fairly, comprehensively, and completely as much data as possible. Evangelicals must demonstrate intellectual qualities. But **theology exists in a tension-filled association with non-Christian thought**, for 2000 years
- Evangelical theology is required to heed the points from the academic disciplines, including the challenge from non-evangelicals. This stops evangelical theology from becoming a group that wanes in public dialogues
- Evangelical **theology is not at home in the secular academic world**
 - Ultimate judgment is not limited to the points of reference rooted in the scholarly world
 - These academic points of view may illuminate important theology topics, and bolster theology, but they should not direct theology's agenda
- For the **highest commitments of theology are spiritual. The home base of theology is the church**
- Theology is a **science of God that assists devote believers to know God and find spiritual wisdom**

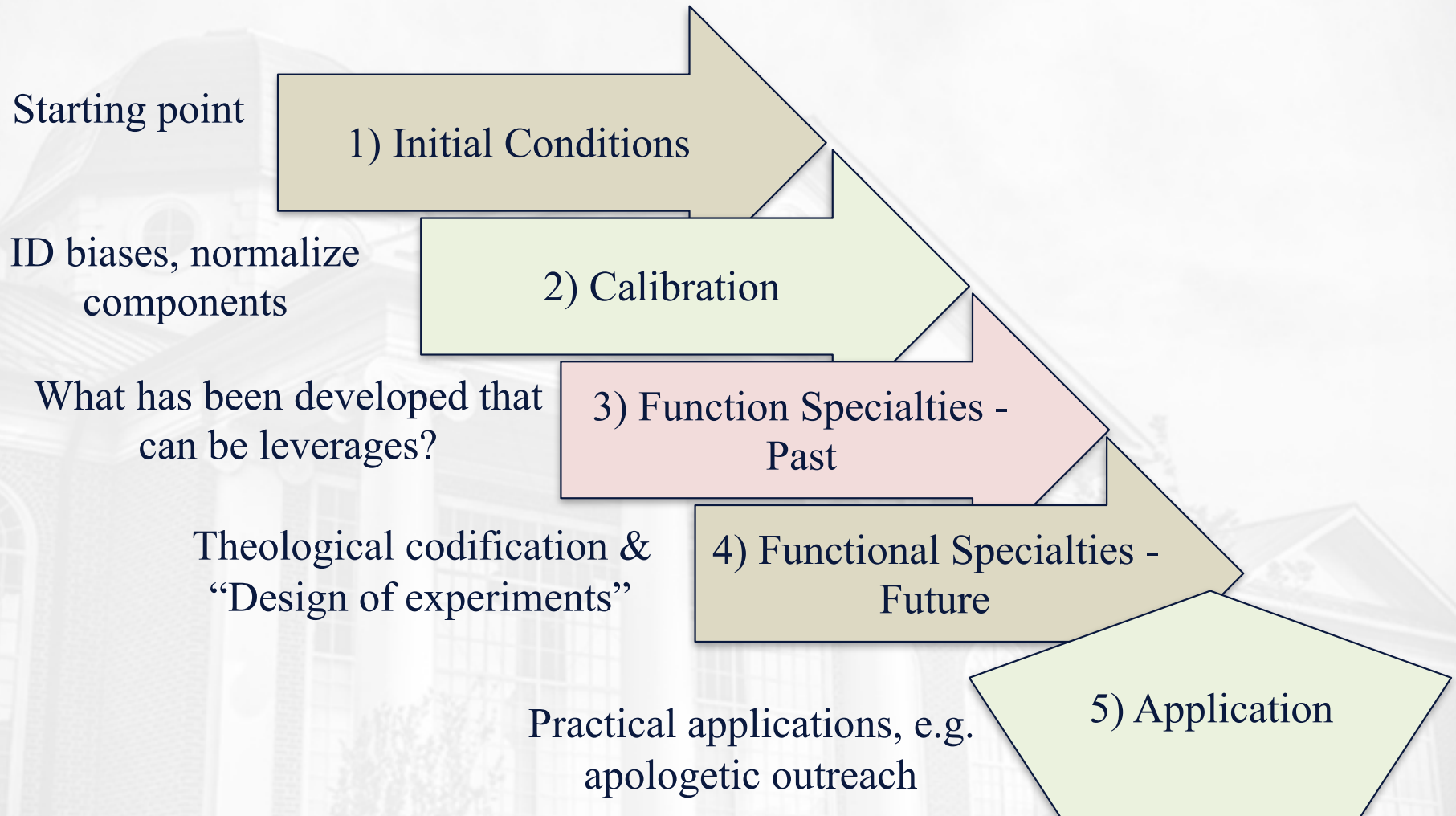
Example: Lonergan's Theological Method

Tad Dune Recommended Ordering

- What happened in the past?
 - 1. **Research**: Identifies what materials (documents, artifacts, and artworks) are relevant to theological issues. Establishes the reliability of materials.
 - 2. **Interpretation**: Interprets what authors meant
 - 3. **History**: Identifies historical trends in development of doctrines and theological schools of thought
 - 4. **Dialectic**: What misconceptions and errors have appeared in historical accounts of history? What have appeared in actual history? What underlying commitments about knowledge, morality, and holiness are at work?
- Moving to the future
 - 5. **Foundations**: Identifies what being converted means to one's knowledge, one's morality, one's holiness. Defines key theological categories for theological reflection
 - 6. **Doctrines**: Identifies the truths and values held by converted people of faith. Produces creeds, catechisms, narratives of sacred persons and events
 - 7. **Systematics**: Organizes the truths and values into a coherent whole based on models in Foundations
 - 8. **Communications**: Communicates and promotes the changes indicated by these religious truths and values. Adapts them to the media and mindsets of readers and congregations.

Each function is vital to entire theological enterprise. No matter which functions certain theologians specialize in, they need to be aware how their tasks work with the rest.

Applying Lonergan's Model



Scientific Method Limitations

- Thomas Kuhn reflects the **growing academic skepticism that contemporary science is progressively refining “the truth” about the real world**. Scientists maintain the impression of progress, he notes, by rewriting their textbooks frequently and eliminating errors, and their newer hypotheses are not based nearly as much as scientists presume on rational or empirical supports (*The Structure of Scientific Revolutions*).
- **Because of limitations of method, science has so little basis for fixed and final truth about reality that it must stand ready to alter every pronouncement it makes and then to alter that alteration ad infinitum.**
- **But Christian theology has historically identified such affirmations not as scientific truth, but as dated opinion.**

Scientific Advantage?

- A further advantage that science is often said to hold over theology is that it deals with **empirically observable realities whereas theology is preoccupied with nonempirical metaphysics.**
- The force of this representation depends, obviously, on a covert assumption that, because they are not empirically observable or verifiable, metaphysical realities are less significant or less real.
- **But might one not with equal force insist that theology has over the physical sciences the advantage of dealing with invisible spiritual realities?**



What is Science?

- The National Academy of Science defines it as, “The use of evidence to construct testable explanations and predictions of natural phenomena, as well as the knowledge generated through this process.”
- So science deals with what can be detected, measured, quantified, explained, and ultimately predicted.
- This sounds like a compelling approach. But is it sufficient to explain complex genomic function adequately?

Theology Contributing to Science

- David Clark and others bring up the important fact that **theology can be useful in scientific exploration.**
- With modern culture embracing the scientific method, and the **basis for knowledge** being centered on epistemological evidence from scientific measurements, there is an encroachment of science on theology.
- Historically it has **proven to be a rich birthing ground for scientific discovery with efficient cause and effect determination.**



Applying Clark's Assertions

Impact	Examples			
Category	Cosmology	Genomics	Miracles	Origins
1) Explains orderly universe	Big Bang	Standard Codon Table	Supernatural intervention	Adam and Eve
2) Provides a metaphysical foundation	An omnipotent God is in all places of his creation	God is in creation and the expression of the genome	Things can happen outside of the physical world	Signatures of being created in the image of God still remains
3) Why science makes a difference	Ordered universe	Show evidence of coding	Can measure occurrence of miracles	Discoverable structure and signatures
4) Suggests future scientific research	Look for evidence aggregation in support of an ultimate source	Examine multi-level genomic design evidence	Document types and situations of supernatural activity	Look for the patterns of a real Adam and Eve
5) Supports assessing competing theories	Single source vs. Multiverse	Design vs. Natural Selection	Divine Action vs. Unknown Phenomena	Created vs. Natural Selection

Vern Poythress

Theologically & Scientifically (Mathematics) Qualified Scholar



- Rev. Dr. Vern Poythress (PhD, Harvard; DTh, Stellenbosch) is professor of New Testament interpretation at Westminster Theological Seminary, where he has taught for 39 years, and is editor of the *Westminster Theological Journal*.
- Education
 - DTh, University of Stellenbosch, 1981
 - MLitt, University of Cambridge, 1977
 - ThM, Westminster Theological Seminary, 1974
 - MDiv, Westminster Theological Seminary, 1974
 - PhD, Harvard University, 1970
 - BS, California Institute of Technology, 1966

Perspective in Symphonic Theology

- There are various **perspectives in the Bible that can be considered in theological analysis**
- Examples
 - 1) **Analogies and Metaphors**
 - A mustard see faith (Luke 13:19)
 - 2) **Models and Pervasive Analogies**
 - God is a shepherd, or the comparison of Adam to Christ
 - 3) **Selective Interest**
 - Such as Kings looking at the history of Israel and Judah, while Chronicles focusing on the history of Judah, or each Gospel having focused concentrations to point out for their audience specific aspects of the nature and character of Christ via a Greco-Roman biography writing style common in that time.

Symphonic Theology Filters

- There is utility in considering perspectives when exploring theology
 - A good Biblical worldview is a proper framework for engaging in theology
- Filter: **Be molded and fashioned by Word of God**, and not other way around. If one notices Biblical analogies and themes one gains insight into passages and see primary interests of Biblical authors and God who inspired their writing
 - One can expand a given perspective into a perspective on the whole. In terms of Biblical understanding this could consist of devotional, doctrinal, and then ethical considerations being explored one at a time in our reading of the Bible
 - Value of expanded perspectives is each perspective can act as a filter to expose insight from a particular vantage point, forming a functional decomposition
- Filter: **The Law and the Ten Commandments**
- Filter: Consider **aspects of God** as a perspective
 - For example, focusing a particular attributes of God, one at a time can form a perspective. This can be useful for elucidating deeper understanding of the things revealed to us by God about His character and what is knowable by us
- Filter: **God as a Biblical theme** and view Scripture from this vantage point
 - How is God found in every situation discussed in the Bible?
 - Another theme perspective could be looking at roles like prophets, kings, and priests. How do they see themselves interacting with the things of God?
- Filter: **Covenant theme in Scripture**, such as the giving of the Abrahamic covenant and how it was fulfilled through his seed and the nation of Israel

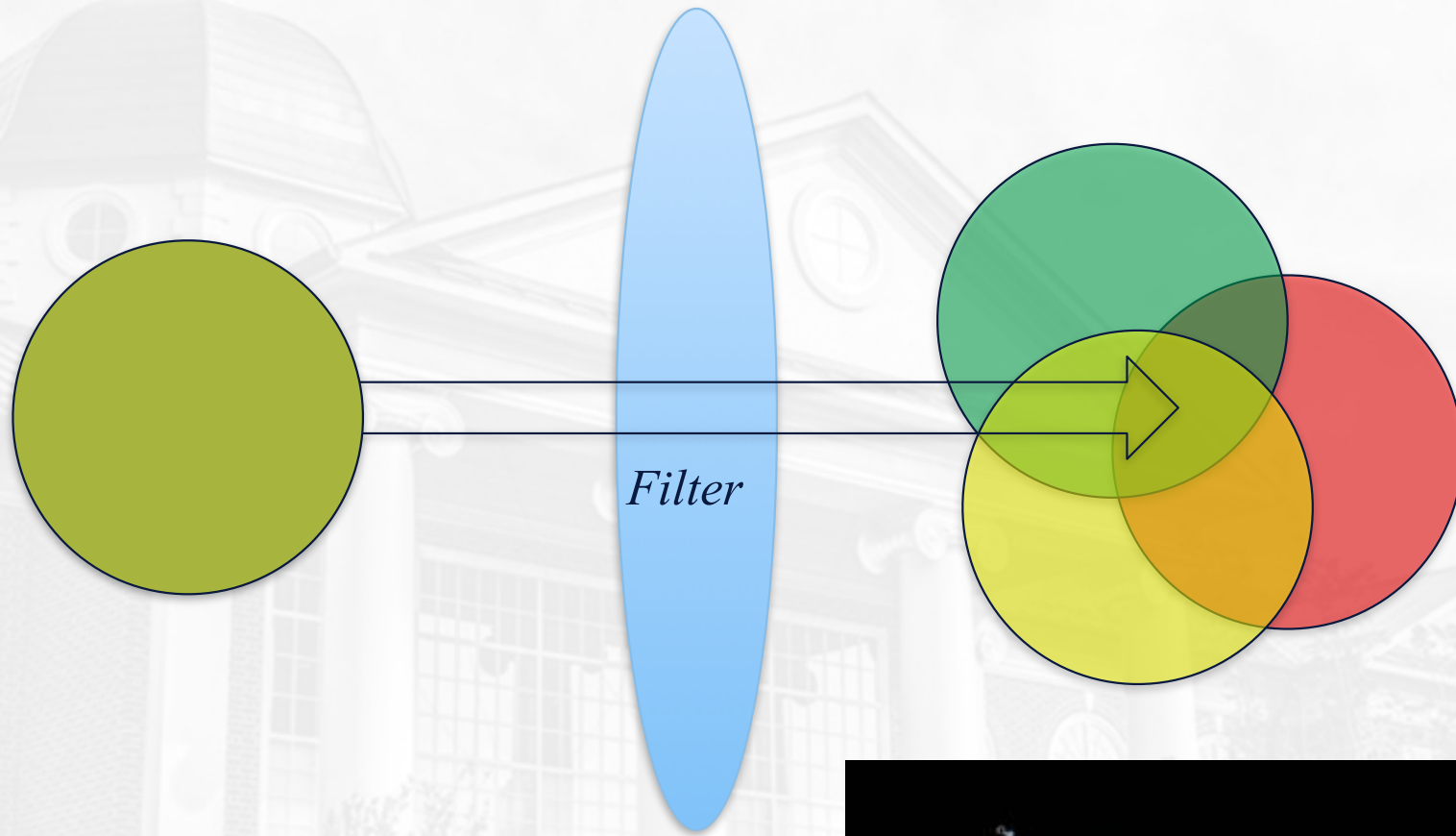
Possible Symphonic Categories

	Perspective	Example	Insights
Po yth res s	Analogies and metaphors	Mustard seed faith	Explain a complicated or hard to grasp concept in a concrete way, e.g. magnitude of potential faith growth
	Models and pervasive analogies	God as a shepherd, comparison of Adam to Christ	Seeing from another perspective, Rethinking God's thoughts
	Selective interest	Kings vs. Chronicles, focus of each Gospel	Greater insight into specific books and intended audience
	Law and Ten Commandments	Role of the law and how man responds	A guide, but man cannot fulfill the law
	Attributes of God	Omnipresent, immutable, eternal	See how God is involved in our world
	God's presence as a theme	Burning bush	God is present in very many ways
Ext ens ion s	By role like prophet, king, and priest	David, Solomon, Samuel, Moses, Nebuchadnezzar	What qualities by role does God approve of?
	By writer	Paul, John, Moses	Various writers, all inspired
	Temporal	Salvation history	Progressive revelation of the nature of God
	Genre	Historical narrative, prophetic, Greco-Roman biographies	Define better what is in each genre
	By situation	War, peace, building a nation	Salvation history, knowing how to Biblically act in various situations

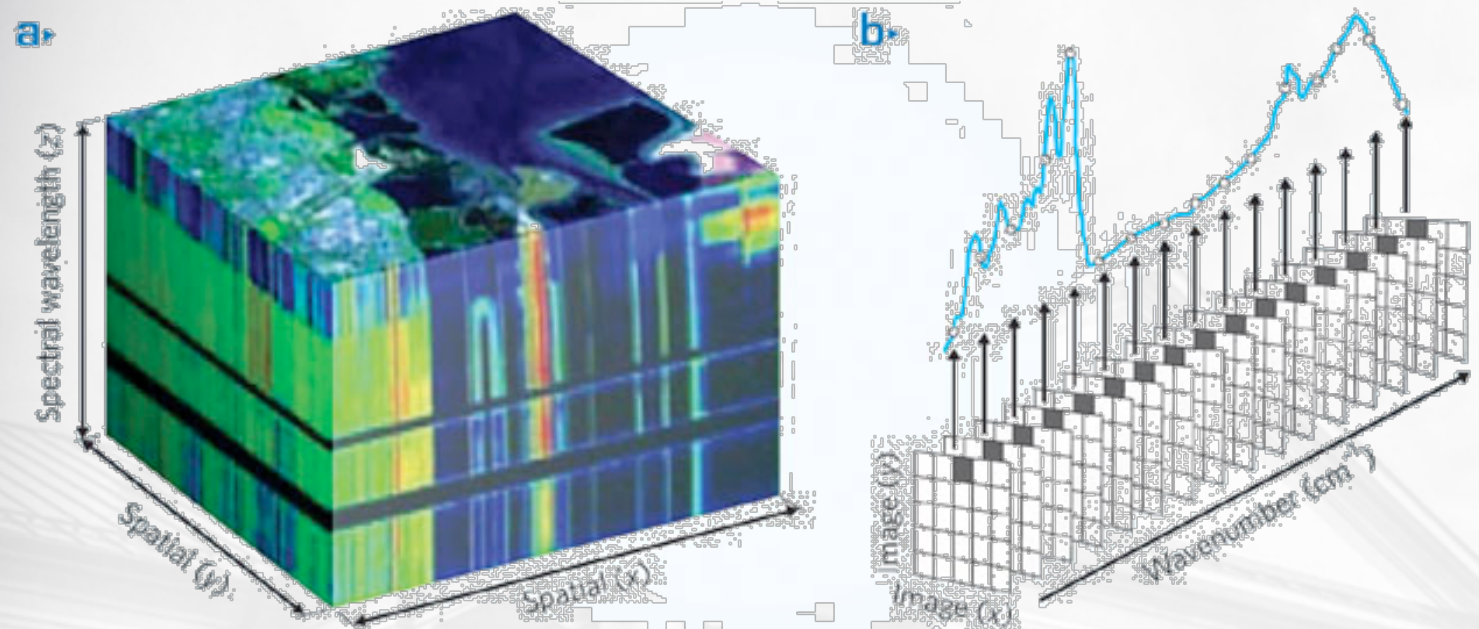
Biblical Perspective

- In terms of perspective, while one might look at an object for mechanical utility another will look at the same object for beauty
- For reading Scripture Poythress argues there are three perspectives that should be considered when reading a passage or pericope, 1) ethical, 2) devotional, and 3) doctrinal considerations
 - Utilizing different perspectives may be analogous in a way to assessing Biblical data like what is done in imagery analysis utilizing techniques like hyperspectral and multispectral decomposition
- By looking at elements one at a time one can derive greater perspective and have the opportunity to gain greater insight

Perspective Filtering

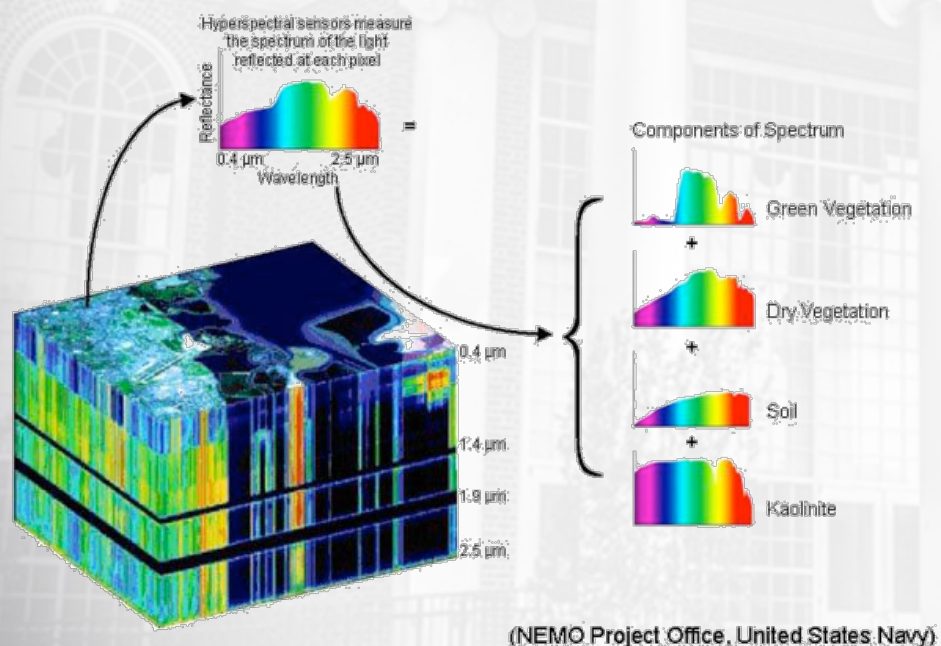


Perspectives: Hyperspectral Imaging Analogy



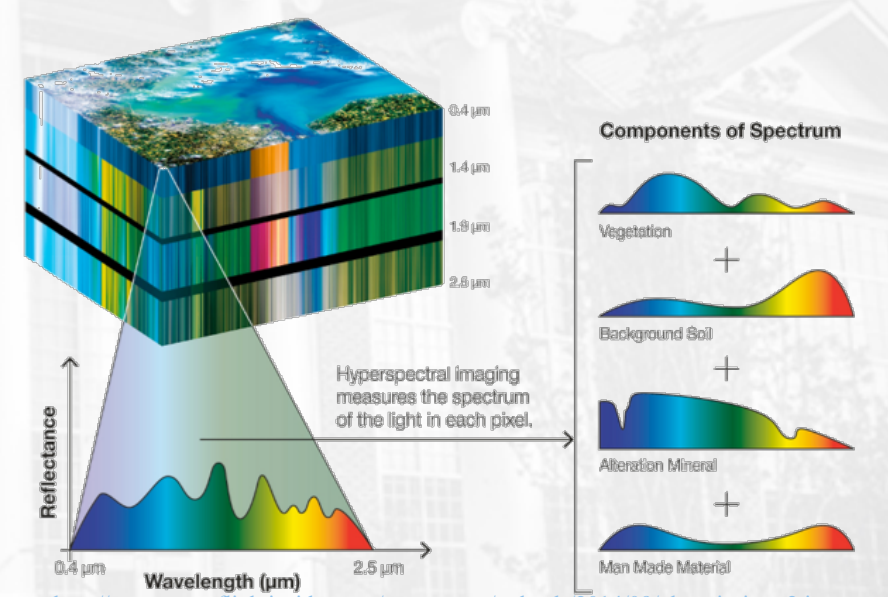
a, The hyperspectral image cube is built up as the sensor passes over the ground or as products pass in front of the sensor. b, The hyperspectral data cube is a three-dimensional image comprised of spatial data (x and y coordinates) and spectral data (created by the diffraction grating, which disperses the wavelengths of light).

http://www.nature.com/nphoton/journal/v3/n11/fig_tab/nphoton2009205_F3.html



(NEMO Project Office, United States Navy)

Hyperspectral Imaging Technology



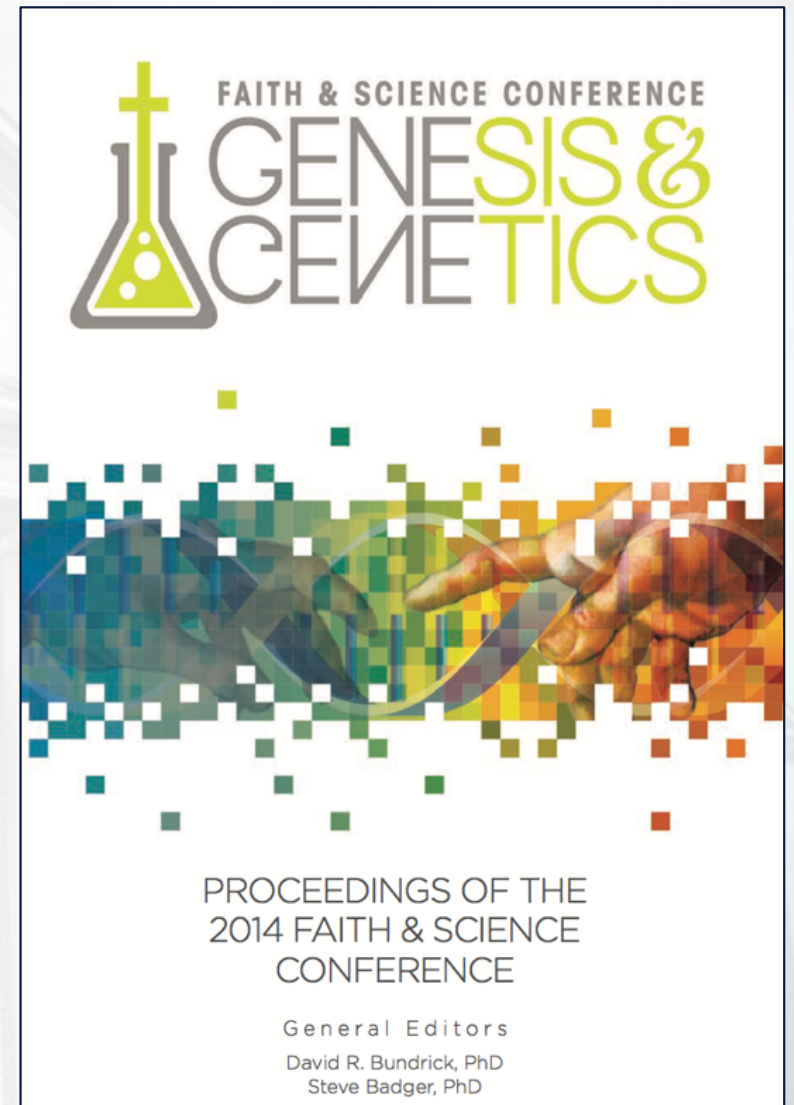
<http://www.spaceflightinsider.com/wp-content/uploads/2014/09/phoenix-img-2.jpg>

<http://morap.missouri.edu/index.php/contamination-characterization-through-airborne-hyperspectral-imaging/>

Faith and Science Conference: Genesis and Genetics - 23-25 June 2014

- Philosophy of Science
- Genetics
- Ethics
- Theology
- Age of Creation
- Integration of Theology and Science

Vern Poythress



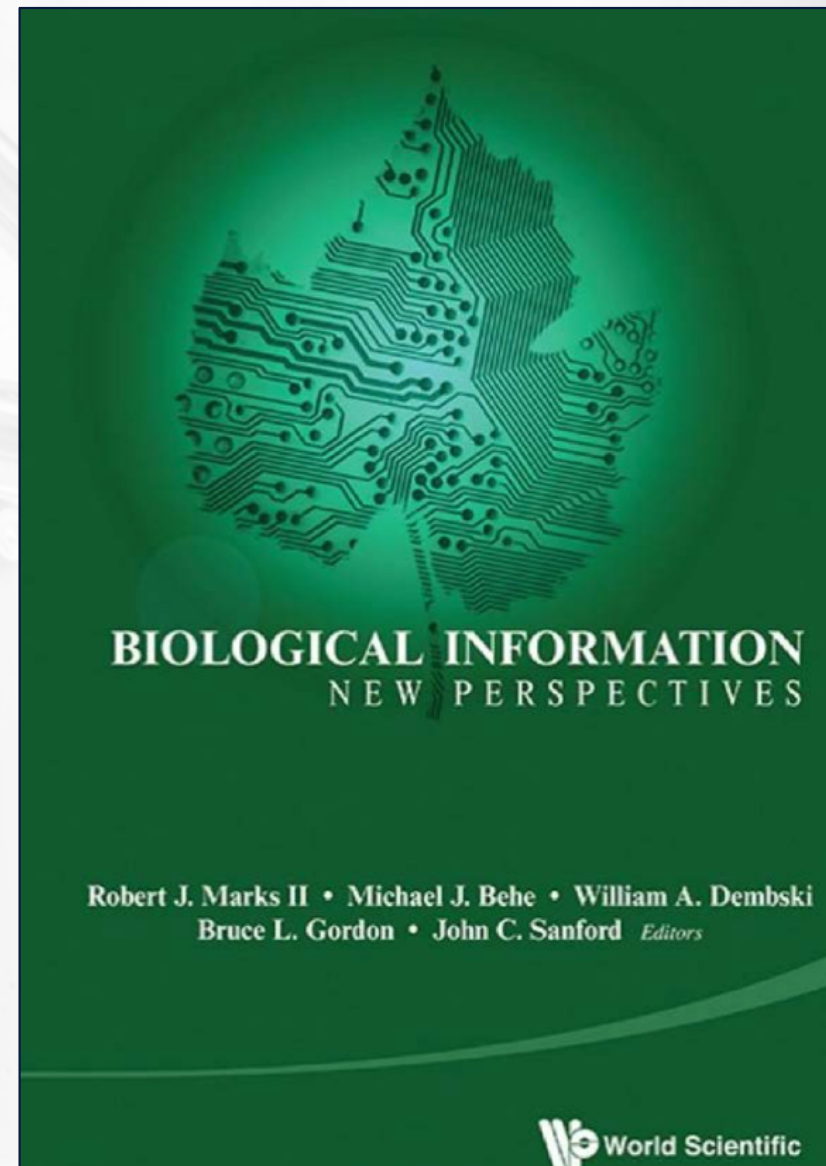
<http://faithandscience.ag.org/>

Biological Information New Perspectives Conference - 31 May to 3 June 2011

- Information Theory and Biology
- Biological Information and Genetic Theory
- Theoretical Molecular Biology
- Biological Information and Self-Organizational Complexity Theory

<http://>

www.biologicalinformationnewperspectives.org/



Scientists Using Christian Methods

Scientist	When	Highlights
Nicholas Copernicus	1473-1543	Astronomer, Sun centric Theory, God in nature
Francis Bacon	1561-1627	Philosopher, Scientific Method, rejected atheism
Johannes Kepler	1571-1630	Astronomer, Orbit Mech, thinking God's thoughts after Him
Galileo Galilei	1564-1642	Astronomer, Heliocentric support via Telescope
Rene Descartes	1596-1650	Philosopher, "I Think Therefore I Am," Scientific Method
Blaise Pascal	1623-1662	Mathematician, Physicist, Theologian , invented calculator
Isaac Newton	1642-1727	Physics, Newtonian Physics, Christian ideals
Robert Boyle	1791-1867	Physics, Laws of Gases, theology
Michael Faraday	1791-1867	Electricity and Magnetism, Christian
Gregor Mendel	1822-1884	Monk , Genetic Inheritance
William Kelvin	1824-1907	Physicist, Thermodynamics, Christian
Max Planck	1858-1947	Physicist, Quantum Mechanics, God is everywhere present
Albert Einstein	1879-1955	Physicist, Special Relativity, Science w/o Religion is lame