

Chapter 4 RATIONAL INQUIRY

Science and Theology and their Limitations

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CONTENTS – CHAPTER 4

Chapter 4	RATIONAL INQUIRY.....	4-1
4.1	INTRODUCTION - SCIENCE.....	4-4
4.1.1	Perceptions.....	4-4
4.1.2	Need for some balance.....	4-4
4.2	WHAT IS SCIENCE AND SCIENTIFIC KNOWLEDGE?.....	4-4
4.2.1	Definitions.....	4-4
4.3	HISTORY OF SCIENCE.....	4-5
4.3.1	Greek rationalism.....	4-5
4.3.2	Western "Modern Science".....	4-5
4.4	NATURE OF SCIENCE.....	4-6
4.4.1	Reductionist in methodology.....	4-6
4.4.2	Reliable.....	4-6
4.4.3	Selective.....	4-6
4.4.4	Communicable.....	4-6
4.4.5	Dynamic.....	4-6
4.4.6	Creative—"Eurekaism".....	4-6
4.4.7	Metaphysical presuppositions.....	4-6
4.5	METHODS OF SCIENCE.....	4-6
4.5.1	False impressions.....	4-7
4.5.2	Scientific method.....	4-7
4.5.3	What are scientific theories?.....	4-7
4.5.4	How can we prove a theory?.....	4-7
4.5.5	Scientific Method—Subjective Elements.....	4-8
4.5.6	Paradigm shifts – Kuhn.....	4-8
4.5.7	Thus one can conclude that science is "motivated belief" not "objective truth".....	4-8
4.6	LIMITATIONS OF SCIENCE.....	4-8
4.6.1	Limited in its domain.....	4-8
4.6.2	Scientific knowledge is not the only sort of knowledge.....	4-9
4.6.3	Science only asks particular sorts of questions.....	4-9
4.6.4	Science describes truth, does not prescribe it.....	4-9
4.6.5	Science is concerned with secondary causes not primary causes.....	4-9
4.6.6	There are different levels of explanation even within science.....	4-9
4.7	THEOLOGY AND ITS LIMITATIONS.....	4-9
4.7.1	Introduction.....	4-9
4.7.2	What is theology and theological knowledge?.....	4-10
4.7.3	Presuppositions.....	4-11
4.7.4	Plato.....	4-11
4.7.5	Aristotle, Aquinas.....	4-11
4.7.6	Renaissance.....	4-11
4.7.7	19 th Century - Theology in crisis.....	4-11
4.7.8	19 th and 20 th Centuries.....	4-11
4.8	NATURE OF THEOLOGY.....	4-12

4.8.1 *How does theology work?* 4-12

4.8.2 *Natural theology* 4-12

4.8.3 *Scripture* 4-12

4.8.4 *Experience*..... 4-12

4.8.5 *Theological "theories"*..... 4-12

4.8.6 *Verifying the "theory"*..... 4-13

4.9 WHAT ARE THE LIMITATIONS OF THEOLOGY ?..... 4-13

4.9.1 *Limited human understanding*..... 4-13

4.9.2 *Limited domain*..... 4-13

4.10 CONCLUSIONS 4-13

4.11 REFERENCES 4-14

4.1 INTRODUCTION - SCIENCE

4.1.1 Perceptions

The success of science over the last 400 years speaks for itself. It has come to dominate 20thC life, having spread from its origin in Western Christendom. The nature of science however is frequently misunderstood. **There are two extreme views.**

- **Science as objective, reliable knowledge**

There is an emphasis on its objectivity. Science is seen as giving reliable factual information. This perception conveys the essence of Modernism – Triumphalism. Often science is seen as the whole of reality, the only route to reliable knowledge. This becomes the problem of *deification*.

- **As a subjective construct, a personal subjective view of the physical world.**

In the late 20th Century, there has been a reaction against science. It is seen as producing many or most of the problems of civilisation: pollution, population explosion, global warming. There is the problem of its *denigration* and relegation to being one of many views about the natural world. There is an emphasis on its subjectivity. Science is seen as one of many relative views of the world. This is the essence of Post-Modernism.

4.1.2 Need for some balance

Neither of the above views, deifying or demonising science, are true. It is neither a panacea for our society ills, nor a culprit to be blamed for them. It is neither the source of all knowledge, nor the holy grail of certainty and objective truth. Unfortunately many scientists who are engaged in science do not have a clear idea of the philosophy of science, of how it works. Many fail to recognise the nature and limitations of science; or that objective and subjective elements are both important in its practice. We need to look therefore at what science is and how it works and to explore a little of the philosophy of science.

Consider three Questions

- **What is science and scientific knowledge?**
- **How do we obtain scientific knowledge?** What do scientists do?
- **What are the limitations of science?**

The problem that arises is, does science explain anything, let alone everything?

4.2 WHAT IS SCIENCE AND SCIENTIFIC KNOWLEDGE?

4.2.1 Definitions

Science is knowledge that is limited by the object of its study and by the methods of that study. It might be defined as what scientists do as scientists, not as private persons. That is, a knowledge of the world obtained by scientific methods.

Object of scientific study

Science is knowledge **about the physical world**. There are other aspects of reality— God, aesthetic knowledge, morals etc.—which are beyond the scope of science.

Domain of science

Science is knowledge **derived in a particular way**— by the scientific method. It is knowledge expressed in a precise, coherent, detailed form. Science is

concerned with the **properties, mechanisms and formative history** of the physical world. There are other ways however of obtaining information about the world. Thus science is not **all** knowledge. For example, a Turner seascape is a perfectly valid view of the world. In scientific terms it is pigmented paint on canvas. It is not knowledge expressed in **everyday** language. e.g. "To love with all your heart" is a true but unscientific statement.

Rational empiricism

This term may be considered a general description of science. Some other terms for consideration, empiricism, perception, reality, realism, idealism, all need defining.

Critical realism

Critical realism perhaps best describes science which is a critical and rational approach to the way things really are. It is not truth, but a way of knowing truth.

There are two aspects: Observation and experiment

There is a real world to be observed—Realism cf. Idealism. Science is one way of knowing about this reality, by empiricism, perception. Science is thus not reality, but a way of knowing about reality

Rational interpretation

Science is concerned with the interpretation of data, thus there is a subjective element. It is not "what is", but an interpretation of what is. Judgments are involved. It builds a model, an approximation of the truth. Thus science is "rational empiricism", critical realism.

4.3 HISTORY OF SCIENCE

There are two threads of influence on modern science. See Chapter 1 for a more detailed consideration of these aspects.

4.3.1 Greek rationalism

The role of reason or naturalism. This considers the world as self-existent, self-governing. Therefore knowledge about it can be derived by reason alone.

4.3.2 Western "Modern Science"

This is a 16th and 17th Century development. The methodology of science—rational empiricism, observation and experiment—developed, in a climate of Christian thought, out of the Renaissance and Reformation. It was significantly influenced by a Judeo-Christian understanding of creation. The world is separate, dependent and good. Thus Nature is perceived as ordered (therefore determinable) as well as contingent (not necessary). Therefore it must be observed to determine its nature. It is temporal, not divine and therefore it is open to investigation. Man has dominion as God's steward, therefore science is an outworking of theology (Ps.111:2, Ps.8). Thus humanity has a mandate for exploring nature. The world is good not evil, therefore we can associate with it. 17thC scientists, as exemplified by the Charter of the Royal Society, saw it as their Christian duty to investigate God's creation, "to think God's thoughts after Him".

4.4 NATURE OF SCIENCE

4.4.1 Reductionist in methodology

It is concerned with measuring, systematising, reducing to laws; i.e. science has an analytical approach, to determine order. Basic science therefore is reductionist and mathematical.

4.4.2 Reliable

Its claims are checked and errors corrected. It is public knowledge capable of *inter-subject verification*.

4.4.3 Selective

Regarding the objects studied

Science is limited to what can be measured or observed. Thus beauty and morals for example are not part of scientific knowledge.

Regarding the way they are studied

Concerned with physical properties, behaviour, formative history. It is not concerned with origins, purpose, governance, but rather with mechanisms. For example, a gemstone. Science considers its composition, not its beauty. Regarding humanity, science considers its physiology, not its relationships or morality.

4.4.4 Communicable

General, objective (therefore it can be repeated). Library information is available for all. Today we would add the internet.

4.4.5 Dynamic

Builds on the past. This is always growing, an approximation of the truth, never complete.

4.4.6 Creative—“Eurekaism”

There is an element of accident, of intuition, in science and of personal input.

4.4.7 Metaphysical presuppositions

Science is based on **non provable** assumptions about its subject, the natural world. Presuppositions about order, that Nature is ordered not random. Science explores that order.

Intelligibility

That we can understand, comprehend nature.

Rationality

That Nature can be reduced to laws, equations etc.

Uniformity

That the same laws apply everywhere. e.g. gravity.

Worthwhileness of science.

4.5 METHODS OF SCIENCE

How do we obtain scientific knowledge? What do scientists do?

4.5.1 False impressions

False impressions exist re the dynamic nature of science. "Science gives the facts." This is reinforced by the constraints of secondary and tertiary teaching. Textbooks and notes are required that give the "facts". Some textbooks give a summary of present facts not a basis for consideration. e.g. Ganong as a textbook of Physiology. Post Graduate research dispels this illusion. There is of course an important objective element.

4.5.2 Scientific method

Objective elements, facts and interpretation—Induction

Baconian induction consists of observation, collection of experimental facts and the formation of a "Hypothesis" based on "the facts".

Induction, hypothesis, deduction, confirmation

A further development is the combination of induction from experimental and observed facts and deduction from principles so determined. Theories are then conceived as objective explanations, verified by further experiment. However induction is not a firm basis for logical proof, nor can theories be absolutely verified. Not all facts can be collected so logically. Some may emerge that do not verify the conclusion.

4.5.3 What are scientific theories?

Some common misconceptions must be dispelled. Scientific theories are not established fact, but neither are they pure speculation. Theories are models to explain the data, not established facts. They make sense of the data. They are continually being modified however. It is part of the nature of science. They are not pictures of reality but *interpretations* of reality. They might be described as maps of the way things are. They need to be updated as does a map, but even if incomplete can be useful guides. They may also be influenced by subjective factors.

4.5.4 How can we prove a theory?

Verification principle?

It is virtually impossible to logically prove a scientific theory. We can never exclude the possibility of non consistent data. e.g. That all swans are black? Newton's theory of gravitation was strongly supported by observations, yet some later observations contradicted it, and Einstein's theory was required. Note that this new theory included the old theory, as still applicable in many, but not all circumstances. Popper suggested that a scientific theory must be capable of falsification, i.e. that although theories can not be proven they can be falsified and if that possibility does not exist, then the "theory" is not scientific. This principle although helpful is not without problem as a single criterion. (How much evidence is needed to falsify a theory?)

What is a measure of a good theory?

There is no single criterion. The following factors however are considered. Consistency with the data; explanatory value (ability to explain the way things are); coherence, unifying value; and falsifiability, Popper's concept of the value of risky theories, i.e those readily falsifiable are worth noting. Predictive value. Simplicity—Ockham's Razor. Fertility, ability to generate experiment. Beauty. These together give a picture of the best explanation of the way things are.

4.5.5 Scientific Method—Subjective Elements

There are however considerable subjective elements to scientific method.

Personal Knowledge - Polanyi

All knowledge is obtained by observer or instrument observation. The importance of interpretation, bias, intellectual climate, i.e. the subjective overlay must therefore be considered. In any investigation there is a need for selectivity of facts from experiments. Thus what is observed is always selective; again a subjective input.

Science is always a community activity

Apprenticeship, the role of groups, the presence of criticism is always present. This implies competence, integrity and judgment. But it also often ensures the continuation of accepted paradigms within a society that may inhibit consideration of certain data.

Science is theory driven

Thus no new worker comes to science with a clean sheet. They are faced with the established wisdom, the current theory. Can it be supported, modified or rejected? "What are the questions being asked?" These are prominent approaches to science. Not simply a collection of objective data and a postulated theory to explain them. This is a caricature of science in action.

4.5.6 Paradigm shifts – Kuhn

Kuhn has brought a new approach to scientific understanding with his concept of science proceeding by paradigm shifts. Intuitive as well as objective knowledge is important. The "eureka" principle. Creativity, flashes of genius. Progress often occurs in giant steps: e.g. Einstein's relativity, antibiotics, structure of DNA. Most scientists however are concerned with refining the current paradigm, not with a shift. This therefore may inhibit new revolutionary shifts. However the past is always important. New insights: data cause a revision not a replacement of the past picture. This represents the dynamic nature of science. Thus science is not just "the facts of science", "the truth", but has a significant subjective "interpretative element" and such interpretations are being continually reviewed in the light of the data and through critical evaluation by the scientific community. However while science is influenced by the subjective overlay, it is not *determined* by the observer. Science is not just a construct unrelated to the way things are.

4.5.7 Thus one can conclude that science is "motivated belief" not "objective truth".

There are however good "grounds" for such belief. It is the explanation of the way things are in nature. "Critical Realism" i.e. it is possible to know the truth about the ways things are by science. Science certainly works as the last 400 years testifies. *However let us be aware of its limitations.* It is the *search* for truth, never absolute truth, and then only the search for "scientific truth", not the search for the whole of truth. We need a bit of humility in the pursuit of science.

4.6 LIMITATIONS OF SCIENCE

4.6.1 Limited in its domain

It is knowledge derived in a particular way, not all knowledge. But science is not limited in its scope within this domain. A "God of the Gaps" is rightly excluded by scientific advance. Such an explanation is an inappropriate response to scientific ignorance. The proper response to gaps in *scientific* knowledge is not to postulate

a divine explanation, but as Coulson has indicated to do more and better science. Scientific history is littered with examples where this would have been excellent advice e.g. life, DNA, development of species, evolution, creation, big bang. There is a sense in which there is no place for God in **scientific** explanation. Cf. Laplace's comment to Napoleon.

4.6.2 Scientific knowledge is not the only sort of knowledge

It is not a substitute for religious knowledge. There are areas of truth that are beyond the methodology of science. We cannot "measure" morality, good or evil. Science has no moral insights. Science can say nothing about relationship, knowing a person, or beauty, or appreciating a sunset or landscape or a painting. These involve aesthetic or moral knowledge.

4.6.3 Science only asks particular sorts of questions

Questions about mechanisms, not meaning. Of how, not why. e.g. oxygen usage in exercise, SOS messages or a kettle boiling may have a scientific explanation or a non scientific one. Some questions may be more relevant in different circumstances. How do I come to be here? As a scientific question the appropriate answer is evolution i.e. a process, a mechanism. Why am I here on the other hand is a theological question and the answer is related to God and purpose.

4.6.4 Science describes truth, does not prescribe it

Laws are descriptions, not forces, not deterministic. Thus evolution is not a force but the description of a process or mechanism. Science doesn't determine what happens in nature, just describes it. Methodological reductionism is intrinsic to science, but ontological reductionism is a metaphysical entity. Theories and laws may need modification as more information emerges.

4.6.5 Science is concerned with secondary causes not primary causes.

Science describes an object fully at one level, but has nothing to say about ultimate or primary causes; e.g. a house may be describable in terms of the primary cause (architect/ design) or of the building materials. Or a cake in terms of the cook, or the ingredients and the cooking process. To describe the processes, do not exclude the cook.

4.6.6 There are different levels of explanation even within science

Physics, chemistry, biology, psychology, sociology and theology all give different, but not conflicting views of humanity. This can be illustrated in many areas. e.g. A house can be explained in terms of bricks and mortar, and of a builder and architect. Steam from a kettle may be explained in terms of physics or because we wish to have tea or make a protest against some restriction. Thus "nothing buttery" is not a logically valid position. It is simply not true that we are "nothing but atoms and molecules". (See Mackay, 1988; Holder, 1993.)

4.7 THEOLOGY AND ITS LIMITATIONS

4.7.1 Introduction

Theology

In today's world science is dominant and popular, while theology seems to be receding and unpopular. Again there are some stereotypes, some perceptions that need to be redressed.

Perceptions

That theology is concerned with the immaterial, the irrational, myth. Therefore, it is maintained, there are no rational or objective grounds for religious belief. Therefore its study is an anachronism. This view is often promoted by popular scientific writers such as Dawkins, whose response to the development of the Starbridge lectureship at Cambridge is expressed in his letter to the *Independent* "What has theology ever said that is the smallest use to anybody...?" (quoted in Holder, 1993, pp. 15-16). The Oxford response was the creation of the Chair in the Public Understanding of Science, financed by Microsoft, provided it was given to Dawkins.

Outdated, superseded

Part of a medieval world, where explanation was in terms of magic and myth.

Not supported by evidence

Dawkins observes that "Science shares with religion the claim that it answers the deep questions about origins, the nature of life, and the cosmos. But there the resemblance ends. Scientific beliefs are supported by evidence. And they get results. Myths and faiths are not and do not". (Dawkins, 1995, p. 33)

Doesn't ask meaningful questions

It is interesting to see this aspect developed by Dawkins in his response to the Duke of Edinburgh in the meetings arranged by the Duke to discuss science.

None of these contentions are true but they represent a discarding of theological knowledge by many as being non knowledge. As such they are of course an example of logical positivism.

Consider three questions

What is theology and is it a legitimate approach in today's world?**How does it work? Methods?****What are its limitations?**

Theology must interact with contemporary culture. Compare the pursuit of Theology with that of science.

4.7.2 What is theology and theological knowledge?**Definition - Rational pursuit of the knowledge about God****Object of theology is God**

Thus knowledge of God and his relationship with the physical universe i.e. with nature, humanity etc. Presupposes a reality beyond the physical world, and that God can be known by theological method. Our experience of God therefore is not just a construct of our minds but is a picture of reality—the way things actually are.

Theology is a human activity

However the subject matter of theology, unlike that of science, transcends us, therefore we are dealing with mystery, transcendent realities.

God can only be known as He reveals himself

It might be argued that theology must have revelation as well as reason as its source of information.

Revelation

God's revelation to us. i.e. God taking the initiative, communicating with us. God reveals himself basically in two ways by:

- *General Revelation*

In nature and history cf. Rom. 1:19–20.

- *Special Revelation*

In Scripture cf. 2 Tim. 3:16, 2 Peter 1:20, 21. Such revelation is neither irrational nor illogical, unless one presupposes "there is no god". Thus like science (and atheism) theology has its presuppositions.

4.7.3 Presuppositions

There is a God, Heb. 1:1, Gen. 1:1. He reveals Himself (in Christ).

Atheist presuppositions are no more rational, nor provable.

History indicates the interaction with culture and a variety of world views, which is part and parcel of the practice of theology. See Chapter 1 for a fuller development of this theme.

4.7.4 Plato

Created the concept of a divide between the real spiritual world of images and the world of matter.

4.7.5 Aristotle, Aquinas

Thomas Aquinas sought to amalgamate Aristotelian philosophy with Christian theology in his 13thC. synthesis. Such an approach was useful, but it needed to be reviewed as theology came to grips with the modern world. In the Thomist synthesis, scientific and theological explanations were integrated. There was an interdependence of natural philosophy and theology. Causation was associated with the efficient cause, the primary cause. Essentially primary and secondary causes were part of a total unity.

4.7.6 Renaissance

The renaissance saw a divorce of scientific explanation and theological explanation. Francis Bacon introduced the concept of the Two Books, the Book of the World (Nature) and the Book of the Word (Scripture). Thus there was generated an independence for science which blossomed in the Enlightenment and in the development of a secular science. This left apparently no role for theology.

4.7.7 19th Century - Theology in crisis

Schleiermacher, and Kant sought to provide a subjective, existential role for theology, concerned primarily with morality and experience. Thus there arose a divorce of science from theology. A divorce from Dogma to become Pietism. A divorce from Natural theology to become Experience

4.7.8 19th and 20th Centuries

In the 19th and 20th Centuries we see some inappropriate relationships developing, with science apparently conflicting with theology or seen as being pursued entirely in isolation from it. The issues of geology, of Darwinian evolution and of Freud's psychology etc. see theology often inadequately coping with a secular scientific world view. Is there a place for "supernaturalism", miracles, prayer etc.?

4.8 NATURE OF THEOLOGY

We need to ask therefore what is the role for theology. It might be suggested that it asks “Why”, “Who” questions, questions of purpose and of ultimate control. Questions such as “Who am I?”, “Why am I here?” These are essentially questions about basic reality, of hope, of life and death and their significance, of morality in relation to nature. These are more overarching questions.

Questions about God, Humanity and the world.

It is concerned with the transcendent, aspects beyond physical reality, questions about origins and governance. We are not self-existent or self-governing. These are not scientific questions but are nevertheless meaningful. They may however interact with current science and its implications.

4.8.1 How does theology work?

Who are the theologians?

Theology is an activity for all, not just an academic discipline, i.e. to engage in the pursuit of the implications of contemporary culture for our understanding of God etc.

Theological method

Theological knowledge may be obtained by using reason to lead to faith as in Aquinas, by examining the data, forming models and testing the explanatory power of these models. In some respects it is not unlike the bottom-up thinking of science. There are important differences however. The sources of data are somewhat different, but there is nevertheless an objective element.

4.8.2 Natural theology

Nature forms the basis of information about God—the God of nature. The argument from design, the teleological argument is of this sort. As is the argument from causation, the cosmological argument. The arrival at an understanding about God, about faith is part of the Aquinas system. Reason then leads to faith. *It has clear limitations as a proof of God however.* Natural theology has been given a new exposure in the late 20thC with the New Natural Theology. Evidences from physics and cosmology have suggested to many a theistic explanation as the most appropriate explanation of the laws of nature. Davies, for example, has written extensively about this aspect as have others. The Anthropic principle or Goldilocks effect will be discussed later. One must be aware however of the limitations of natural theology, both as a proof of God and as a means of discovering a personal God.

4.8.3 Scripture

Both the Old Testament in its record of the words and activity of God in relation to Israel, and the New Testament with the record of the gospels, bring content to theology. We are not dealing with credulity or blind faith. There is a basis for theological knowledge.

4.8.4 Experience

This may be the personal experience of individuals in their encounter with God or the community experience of the church, of tradition.

4.8.5 Theological “theories”

Theology of necessity must have its models, its symbols. Models and metaphors are necessary to describe God: as Trinity, as a person, as a father. All of these

are an attempt to make sense of the data. These models may need to change with time. There are thus many analogies with science. Reason is also important to interpret the data and translate it to our own cultural background.

4.8.6 Verifying the "theory"

In verifying the truth or otherwise of a theological theory we need to consider all the data from nature, scripture, experience, and determine its coherency. Does it make sense? Is it consistent with the data, with the way things are? Thus with theology as with science, epistemology mirrors ontology. Experience, whether scientific or theological, must make sense of the picture and indicate the way things are. Thus one can conclude that theology is "motivated belief" not just "subjective perception". It has three aspects—presuppositions, content, belief.

4.9 WHAT ARE THE LIMITATIONS OF THEOLOGY ?

4.9.1 Limited human understanding

We are finite and sinful. Theology is a human exercise. Therefore humility in pursuing theology is appropriate. This is indicated in two areas particularly. In interpretation, e.g. the interpretation of Genesis; and in natural theology, as science is not the way to God.

4.9.2 Limited domain

Theology is not the appropriate source of scientific knowledge and cannot replace the scientific knowledge of nature. God is not a *God of the Gaps*.

4.10 CONCLUSIONS

Theology and science have many similarities in their methodology. Science is not just objective truth and theology a subjective construct. There are presuppositions, content, and a belief system in both. However their subject matter differs. There is a need to recognise the limitations of both. Both ask meaningful questions and provide valid, if incomplete answers, in their respective domains, contributing to our total view of reality.

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