Methodological Naturalism: Necessary for Science or Superfluous?

by
Don Petcher
Department of Physics, Covenant College

Outline

Goal: To approach the discussing from a different angle;

Outline

Goal: To approach the discussing from a different angle;
perhaps a refreshing one

Outline

Goal: To approach the discussing from a different angle; perhaps a refreshing one

Outline:

- A scientist's reaction to methodological naturalism

Outline

Goal: To approach the discussing from a different angle; perhaps a refreshing one

Outline:

- A scientist's reaction to methodological naturalism
- The Demarcation Problem

Outline

Goal: To approach the discussing from a different angle; perhaps a refreshing one

Outline:

- A scientist's reaction to methodological naturalism
- The Demarcation Problem
- The Natural/Supernatural dualism

Outline

Goal: To approach the discussing from a different angle; perhaps a refreshing one

Outline:

- A scientist's reaction to methodological naturalism
- The Demarcation Problem
- The Natural/Supernatural dualism
- "Mere Science"

Outline

Goal: To approach the discussing from a different angle; perhaps a refreshing one

Outline:

- A scientist's reaction to methodological naturalism
- The Demarcation Problem
- The Natural/Supernatural dualism
- "Mere Science"
- "The Feynman Integrity Principle"

Outline

Goal: To approach the discussing from a different angle; perhaps a refreshing one

Outline:

- A scientist's reaction to methodological naturalism
- The Demarcation Problem
- The Natural/Supernatural dualism
- "Mere Science"
- "The Feynman Integrity Principle"
- Some remarks about education

Outline

- A scientist's reaction to methodological naturalism
- The Demarcation Problem
- The Natural/Supernatural dualism
- The Feynman Integrity Principle
- Mere Science
- Some remarks about education

Methodological Naturalism (MN)

OK, MacDonald and Tro (CSR, Winter 2009) have convinced me that it makes sense for a philosopher to look at scientists and observe “they are pursuing methodological naturalism”.

Methodological Naturalism (MN)

OK, MacDonald and Tro (CSR, Winter 2009) have convinced me that it makes sense for a philosopher to look at scientists and observe “they are pursuing methodological naturalism”. But when I hear someone saying that I “must” follow MN, I get suspicious.

Methodological Naturalism (MN)

OK, MacDonald and Tro (CSR, Winter 2009) have convinced me that it makes sense for a philosopher to look at scientists and observe “they are pursuing methodological naturalism”.
But when I hear someone saying that I “must” follow MN, I get suspicious.
After all, when I am working out some equations, I am not thinking “I’ve got to remember to follow MN here”.

Methodological Naturalism (MN)

OK, MacDonald and Tro (CSR, Winter 2009) have convinced me that it makes sense for a philosopher to look at scientists and observe “they are pursuing methodological naturalism”.
But when I hear someone saying that I “must” follow MN, I get suspicious.
After all, when I am working out some equations, I am not thinking “I’ve got to remember to follow MN here”.
I’m rather thinking, I’ve got to be careful not to make a mistake in this derivation. . .

Methodological Naturalism (MN)

OK, MacDonald and Tro (CSR, Winter 2009) have convinced me that it makes sense for a philosopher to look at scientists and observe “they are pursuing methodological naturalism”.
But when I hear someone saying that I “must” follow MN, I get suspicious.
After all, when I am working out some equations, I am not thinking “I’ve got to remember to follow MN here”.
I’m rather thinking, I’ve got to be careful not to make a mistake in this derivation. . . Or when working at the lab bench. . .

Methodological Naturalism (MN)

As the abstract says, I am rather thinking something along the lines of how the last time I ran the experiment there was this and that problem, so I need to be careful to do thus and so this time to guard against those kinds of issues, and so on.

Methodological Naturalism (MN)

As the abstract says, I am rather thinking something along the lines of how the last time I ran the experiment there was this and that problem, so I need to be careful to do thus and so this time to guard against those kinds of issues, and so on.
So the immediate question that comes to mind is “what is their agenda?”

Methodological Naturalism (MN)

As the abstract says, I am rather thinking something along the lines of how the last time I ran the experiment there was this and that problem, so I need to be careful to do thus and so this time to guard against those kinds of issues, and so on.
So the immediate question that comes to mind is “what is their agenda?”
(Perhaps I have been listening to the postmodernists a little too much!)

Methodological Naturalism (MN)

As the abstract says, I am rather thinking something along the lines of how the last time I ran the experiment there was this and that problem, so I need to be careful to do thus and so this time to guard against those kinds of issues, and so on.
So the immediate question that comes to mind is “what is their agenda?”
(Perhaps I have been listening to the postmodernists a little too much!)
(Although science is the last modernist discipline left.)

Methodological Naturalism (MN)

A read of the literature uncovers (at least) the following beliefs or motives:

- MN is simply true of science “by definition”

Methodological Naturalism (MN)

A read of the literature uncovers (at least) the following beliefs or motives:

- MN is simply true of science “by definition”
- To keep the “supernatural” out

Methodological Naturalism (MN)

A read of the literature uncovers (at least) the following beliefs or motives:

- MN is simply true of science “by definition”
- To keep the “supernatural” out
- To keep creationists (or ID) out

Methodological Naturalism (MN)

A read of the literature uncovers (at least) the following beliefs or motives:

- MN is simply true of science “by definition”
- To keep the “supernatural” out
- To keep creationists (or ID) out
- To keep crackpots out (?)

Methodological Naturalism (MN)

A read of the literature uncovers (at least) the following beliefs or motives:

- MN is simply true of science “by definition”
- To keep the “supernatural” out
- To keep creationists (or ID) out
- To keep crackpots out (?)
- To limit science in order to make space for other ways of knowing

Methodological Naturalism (MN)

What's the problem?

- MN is simply true of science "by definition"
- To keep the "supernatural" out
- To keep creationists (or ID) out
- To keep crackpots out (?)
- To limit science in order to make space for other ways of knowing

Methodological Naturalism (MN)

What's the problem?

- MN is simply true of science "by definition"
  $\Rightarrow$The Demarcation Problem
- To keep the "supernatural" out

- To keep creationists (or ID) out
- To keep crackpots out (?)
- To limit science in order to make space for other ways of knowing

Methodological Naturalism (MN)

What's the problem?

- MN is simply true of science "by definition"
  $\Rightarrow$The Demarcation Problem
- To keep the "supernatural" out
  $\Rightarrow$A natural/supernatural demarcation problem
- To keep creationists (or ID) out
- To keep crackpots out (?)
- To limit science in order to make space for other ways of knowing

Methodological Naturalism (MN)

What's the problem?

- MN is simply true of science "by definition"
  $\Rightarrow$The Demarcation Problem
- To keep the "supernatural" out
  $\Rightarrow$A natural/supernatural demarcation problem
- To keep creationists (or ID) out
- To keep crackpots out (?)
- To limit science in order to make space for other ways of knowing
  $\Rightarrow$Science as a cultural enterprise does pretty well at these

Outline

- A scientist's reaction to methodological naturalism
- The Demarcation Problem
- The Natural/Supernatural dualism
- Mere Science
- The Feynman Integrity Principle
- Some remarks about education

Demarcation Problem (background)

Demarcation Problem (background)

- Demarcation: to define science as opposed to non-science

Demarcation Problem (background)

- Demarcation: to define science as opposed to non-science
- Why important?

Demarcation Problem (background)

- Demarcation: to define science as opposed to non-science
- Why important?
  - Modernist view: (only) science brings objective/universal knowledge

Demarcation Problem (background)

- Demarcation: to define science as opposed to non-science
- Why important?
  - Modernist view: (only) science brings objective/universal knowledge
  - need to know when we have objective/universal knowledge

Demarcation Problem (background)

- Demarcation: to define science as opposed to non-science
- Why important?
  - Modernist view: (only) science brings objective/universal knowledge
  - need to know when we have objective/universal knowledge
  - need to know how to reject knowledge claims

Demarcation Problem (background)

- Demarcation: to define science as opposed to non-science
- Why important?
  - Modernist view: (only) science brings objective/universal knowledge
  - need to know when we have objective/universal knowledge
  - need to know how to reject knowledge claims
  - need to know how better to bash religion?

Demarcation Problem (background)

- Demarcation: to define science as opposed to non-science
- Why important?
  - Modernist view: (only) science brings objective/universal knowledge
  - need to know when we have objective/universal knowledge
  - need to know how to reject knowledge claims
  - need to know how better to bash religion?
- Nowadays: It'd be nice to know what science is so we know what to teach

Demarcation Problem (background)

- Demarcation: to define science as opposed to non-science
- Why important?
  - Modernist view: (only) science brings objective/universal knowledge
  - need to know when we have objective/universal knowledge
  - need to know how to reject knowledge claims
  - need to know how better to bash religion?
- Nowadays: It'd be nice to know what science is so we know what to teach
  $\Rightarrow$(Courts act as if there is no such problem)

Demarcation Problem (Laudan, 1983)

(Existence of demarcation) “It is probably fair to say that there is no demarcation line between science and non-science, or between science and pseudo-science, which would win assent from a majority of philosophers.” — “The Demise of the Demarcation Problem”

Demarcation Problem (Laudan, 1983)

(conditions of adequacy) “[T]he quest for the latter-day demarcation criterion involves an attempt to render explicit those shared but largely implicit sorting mechanisms whereby most of us can agree about paradigmatic cases of the scientific and the non-scientific.”

Demarcation Problem (Laudan, 1983)

(necessary/sufficient?)

Demarcation Problem (Laudan, 1983)

(necessary/sufficient?)

- A condition that is only necessary does not tell us that something (e.g. physics) is definitely a science

Demarcation Problem (Laudan, 1983)

(necessary/sufficient?)

- A condition that is only necessary does not tell us that something (e.g. physics) is definitely a science
- A condition that is only sufficient does not tell us when something (e.g. astrology) is not a science

Demarcation Problem (Laudan, 1983)

"[T]he demarcaton criteria are typically used as *machines de guerre* in a polemical battle between rival camps. Indeed, many of those most closely associated with the demarcation issue have evidently had hidden (and sometimes not so hidden) agendas of various sorts."

Demarcation Problem (Laudan, 1983)

"[T]he demarcaton criteria are typically used as *machines de guerre* in a polemical battle between rival camps. Indeed, many of those most closely associated with the demarcation issue have evidently had hidden (and sometimes not so hidden) agendas of various sorts."
"But the value-loaded character of the term 'science' (and its cognates) in our culture should make us realize that the labeling of a certain activity as 'scientific' or 'unscientific' has social and political ramifications which go well beyond the taxonomic task of sorting beliefs into two piles."

Demarcation Problem (Laudan, 1983)

"[T]he demarcaton criteria are typically used as *machines de guerre* in a polemical battle between rival camps. Indeed, many of those most closely associated with the demarcation issue have evidently had hidden (and sometimes not so hidden) agendas of various sorts."
"But the value-loaded character of the term 'science' (and its cognates) in our culture should make us realize that the labeling of a certain activity as 'scientific' or 'unscientific' has social and political ramifications which go well beyond the taxonomic task of sorting beliefs into two piles."
$\Rightarrow$Everyone knows that saying "that's unscientific" is pejorative.

Demarcation Problem (Laudan, 1983)

"*The evident epistemic heterogeneity of the activities and beliefs customarily regarded as scientific should alert us to the probable futility of seeking an epistemic version of a demarcation criterion.*" (Italics his)

Demarcation Problem (Laudan, 1983)

"*The evident epistemic heterogeneity of the activities and beliefs customarily regarded as scientific should alert us to the probable futility of seeking an epistemic version of a demarcation criterion.*" (Italics his)
"If we would stand up and be counted on the side of reason, we ought to drop terms like 'pseudo-science' and 'unscientific' from our vocabulary; they are just hollow phrases which do only emotive work for us. . . ."

Demarcation Problem (Laudan quote)

“ . . . Insofar as our concern is to protect ourselves and our fellows from the cardinal sin of believing what we wish were so rather than what there is substantial evidence for (and surely that is what most forms of ‘quackery’ come down to), then our focus should be squarely on the empirical and conceptual credentials for claims about the world. The ‘scientific’ status of these claims is altogether irrelevant.”

Demarcation Problem (Laudan quote)

" . . . Insofar as our concern is to protect ourselves and our fellows from the cardinal sin of believing what we wish were so rather than what there is substantial evidence for (and surely that is what most forms of 'quackery' come down to), then our focus should be squarely on the empirical and conceptual credentials for claims about the world. The 'scientific' status of these claims is altogether irrelevant."
The problem *is* related to the postmodern shift;

Demarcation Problem (Laudan quote)

" . . . Insofar as our concern is to protect ourselves and our fellows from the cardinal sin of believing what we wish were so rather than what there is substantial evidence for (and surely that is what most forms of 'quackery' come down to), then our focus should be squarely on the empirical and conceptual credentials for claims about the world. The 'scientific' status of these claims is altogether irrelevant."

The problem *is* related to the postmodern shift; the modernist hope lost its sure moorings!

Demarcation Problem (Laudan quote)

" . . . Insofar as our concern is to protect ourselves and our fellows from the cardinal sin of believing what we wish were so rather than what there is substantial evidence for (and surely that is what most forms of 'quackery' come down to), then our focus should be squarely on the empirical and conceptual credentials for claims about the world. The 'scientific' status of these claims is altogether irrelevant."

The problem *is* related to the postmodern shift; the modernist hope lost its sure moorings! (There is no sure method to get objective, neutral truth from reason and experience alone)

Richard Feynman on “What is science?”

What is science? Of course you all must know, if you teach it. That’s common sense. What can I say? If you don’t know, every teacher’s edition of every textbook gives a complete discussion of the subject. There is some kind of distorted distillation and watered-down and mixed up words of Francis Bacon from some centuries ago, words which then were supposed to be the deep philosophy of science.

Richard Feynman on “What is science?”

What is science? Of course you all must know, if you teach it. That’s common sense. What can I say? If you don’t know, every teacher’s edition of every textbook gives a complete discussion of the subject. There is some kind of distorted distillation and watered-down and mixed up words of Francis Bacon from some centuries ago, words which then were supposed to be the deep philosophy of science. But one of the greatest experimental scientists of the time who was really doing something, William Harvey, said that what Bacon said science was, was the science that a lord chancellor would do. He spoke of making observations, but omitted the vital factor of judgment about what to observe and what to pay attention to.

Richard Feynman on “What is science?”

What is science? Of course you all must know, if you teach it. That’s common sense. What can I say? If you don’t know, every teacher’s edition of every textbook gives a complete discussion of the subject. There is some kind of distorted distillation and watered-down and mixed up words of Francis Bacon from some centuries ago, words which then were supposed to be the deep philosophy of science. But one of the greatest experimental scientists of the time who was really doing something, William Harvey, said that what Bacon said science was, was the science that a lord chancellor would do. He spoke of making observations, but omitted the vital factor of judgment about what to observe and what to pay attention to.

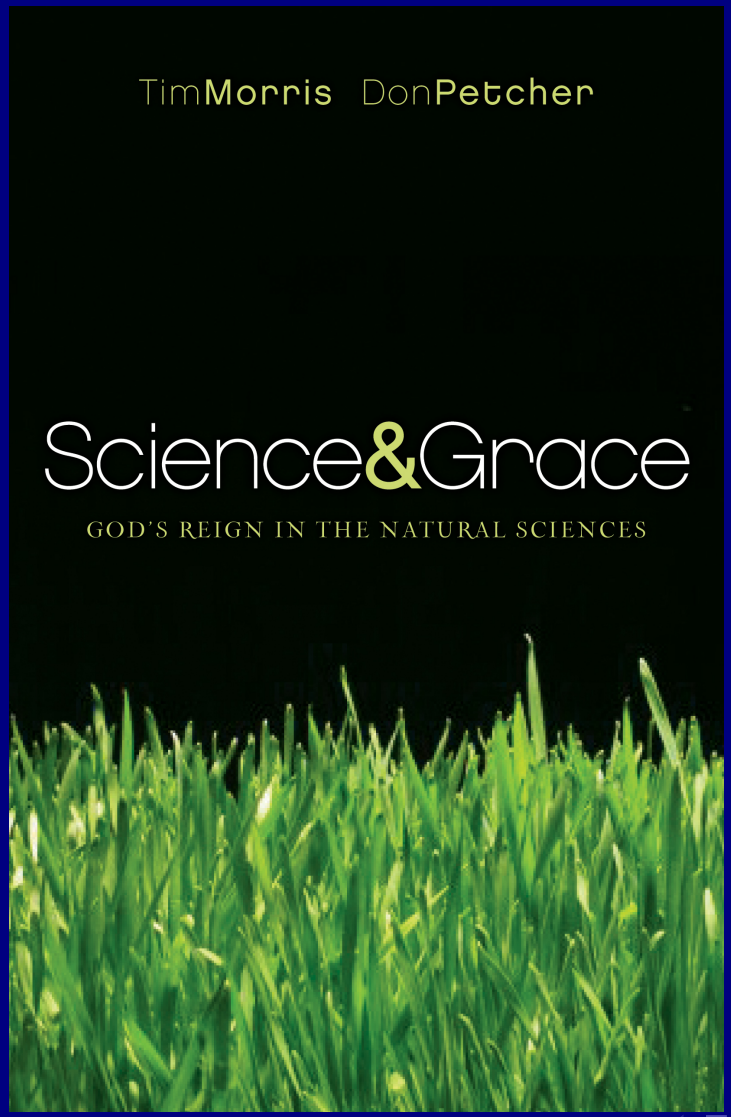
And so what science is, is not what the philosophers have said it is and certainly not what the teacher editions say it is. What it is, is a problem which I set for myself after I said I would give this talk.

The Pleasure of Finding Things Out, pp. 173-4

Outline

- A scientist's reaction to methodological naturalism
- The Demarcation Problem
- The Natural/Supernatural dualism — A Tale of Two Powers
- Mere Science
- The Feynman Integrity Principle
- Some remarks about education

Science & Grace



A Medieval Issue — “Two Powers”

- A twelfth century issue: Is God constrained in His actions? As a necessary God?

A Medieval Issue — “Two Powers”

- A twelfth century issue: Is God constrained in His actions? As a necessary God?
- Can God change the past?

A Medieval Issue — “Two Powers”

- A twelfth century issue: Is God constrained in His actions? As a necessary God?
- Can God change the past?
- Answer (Anselm - 1033-1109):

A Medieval Issue — “Two Powers”

- A twelfth century issue: Is God constrained in His actions? As a necessary God?
- Can God change the past?
- Answer (Anselm - 1033-1109):
  - God cannot be corrupted

A Medieval Issue — “Two Powers”

- A twelfth century issue: Is God constrained in His actions? As a necessary God?
- Can God change the past?
- Answer (Anselm - 1033-1109):
  - God cannot be corrupted
  - God cannot make false what is true

A Medieval Issue — “Two Powers”

- A twelfth century issue: Is God constrained in His actions? As a necessary God?
- Can God change the past?
- Answer (Anselm - 1033-1109):
  - God cannot be corrupted
  - God cannot make false what is true
    $\Rightarrow$God cannot go against His past will

A Medieval Issue — “Two Powers”

A Medieval Issue — “Two Powers”

- Absolute Power (*potentia absoluta*):
- Ordained Power (*potentia ordinata*):

A Medieval Issue — “Two Powers”

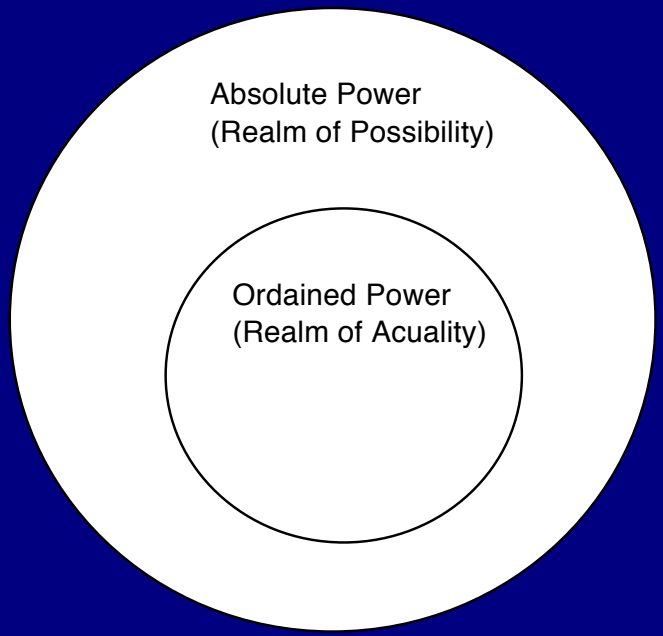
- Absolute Power (*potentia absoluta*):
  that which God can do (all that is logically possible)
- Ordained Power (*potentia ordinata*):

A Medieval Issue — “Two Powers”

- Absolute Power (*potentia absoluta*):
  that which God can do (all that is logically possible)
- Ordained Power (*potentia ordinata*):
  that which God actually ordains to do

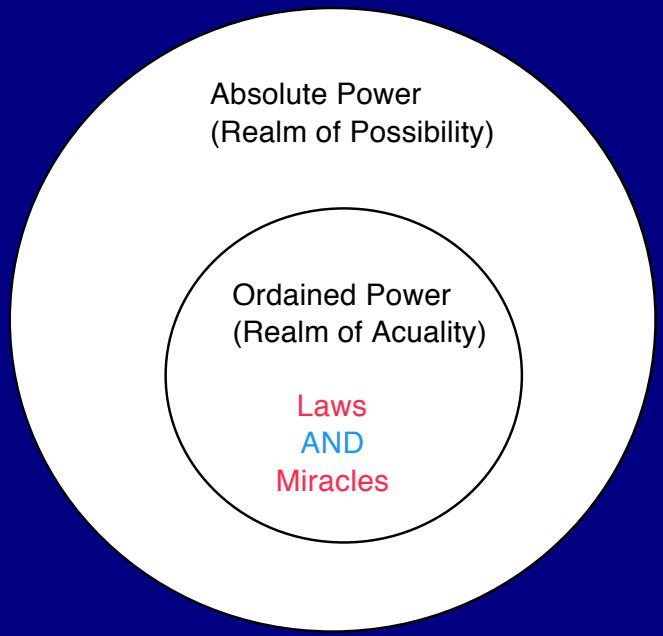
A Medieval Issue — “Two Powers”

- Absolute Power (*potentia absoluta*):
  that which God can do (all that is logically possible)
- Ordained Power (*potentia ordinata*):
  that which God actually ordains to do



A Medieval Issue — “Two Powers”

- Absolute Power (*potentia absoluta*):
  that which God can do (all that is logically possible)
- Ordained Power (*potentia ordinata*):
  that which God actually ordains to do



A theological pronouncement

The condemnation of 1277 in Paris

- Aristotle rediscovered in Europe ca. 1190

A theological pronouncement

The condemnation of 1277 in Paris

- Aristotle rediscovered in Europe ca. 1190
  $\Rightarrow$God cannot go against (Aristotilian) logic

A theological pronouncement

The condemnation of 1277 in Paris

- Aristotle rediscovered in Europe ca. 1190
  $\Rightarrow$God cannot go against (Aristotilian) logic
  - A vacuum is illogical

A theological pronouncement

The condemnation of 1277 in Paris

- Aristotle rediscovered in Europe ca. 1190
  $\Rightarrow$God cannot go against (Aristotilian) logic
  - A vacuum is illogical
    $\Rightarrow$God cannot move the universe over and leave a vacuum

A theological pronouncement

The condemnation of 1277 in Paris

- Aristotle rediscovered in Europe ca. 1190
  $\Rightarrow$God cannot go against (Aristotilian) logic
  - A vacuum is illogical
    $\Rightarrow$God cannot move the universe over and leave a vacuum
    $\Rightarrow$God cannot create a vacuum

A theological pronouncement

The condemnation of 1277 in Paris

- Aristotle rediscovered in Europe ca. 1190
  $\Rightarrow$God cannot go against (Aristotilian) logic
  - A vacuum is illogical
    $\Rightarrow$God cannot move the universe over and leave a vacuum
    $\Rightarrow$God cannot create a vacuum
- Condemnation of 1277: God cannot be limited by (our) logic

A theological pronouncement

The condemnation of 1277 in Paris

- Aristotle rediscovered in Europe ca. 1190
  $\Rightarrow$God cannot go against (Aristotilian) logic
  - A vacuum is illogical
    $\Rightarrow$God cannot move the universe over and leave a vacuum
    $\Rightarrow$God cannot create a vacuum
- Condemnation of 1277: God cannot be limited by (our) logic
  $\Rightarrow$opens the door for more free action of God

A “revolution” in investigating the world

The rise of modern science

- Nicolaus Copernicus (1472 –1542)
- Francis Bacon (1561 – 1626)
- Galileo Galilei (1563 – 1642)
- Johannes Kepler (1570 – 1630)
- René Descartes (1596 – 1650)
- Robert Boyle (1627 – 1691)
- Isaac Newton (1643 – 1727)

A shift in terminology and emphasis

- The issue of “two powers” was no longer pressing

A shift in terminology and emphasis

- The issue of “two powers” was no longer pressing
- The terminology remained

A shift in terminology and emphasis

- The issue of “two powers” was no longer pressing
- The terminology remained
- Some began to use the terminology differently:

A shift in terminology and emphasis

- The issue of “two powers” was no longer pressing
- The terminology remained
- Some began to use the terminology differently:
- Focus on “laws” of nature, or God’s “ordinary” activity

A shift in terminology and emphasis

- The issue of “two powers” was no longer pressing
- The terminology remained
- Some began to use the terminology differently:
- Focus on “laws” of nature, or God’s “ordinary” activity
- Miracles seem not to fit

A shift in terminology and emphasis

- The issue of “two powers” was no longer pressing
- The terminology remained
- Some began to use the terminology differently:
- Focus on “laws” of nature, or God’s “ordinary” activity
- Miracles seem not to fit
- potentia ordinata (ordained power)
  $\Rightarrow$potentia ordinarius (ordinary power)

A mechanistic philosophy

In the mean time. . .

- The mechanistic philosophy saw great promise

A mechanistic philosophy

In the mean time. . .

- The mechanistic philosophy saw great promise
- Robert Boyle saw it as God's sovereign sustenance

A mechanistic philosophy

In the mean time. . .

- The mechanistic philosophy saw great promise
- Robert Boyle saw it as God's sovereign sustenance

  $\Rightarrow$ a Christian view of science

A mechanistic philosophy

In the mean time. . .

- The mechanistic philosophy saw great promise
- Robert Boyle saw it as God's sovereign sustenance

  $\Rightarrow$ a Christian view of science

But by the nineteenth century the mechanistic universe no longer needed God.

A mechanistic philosophy

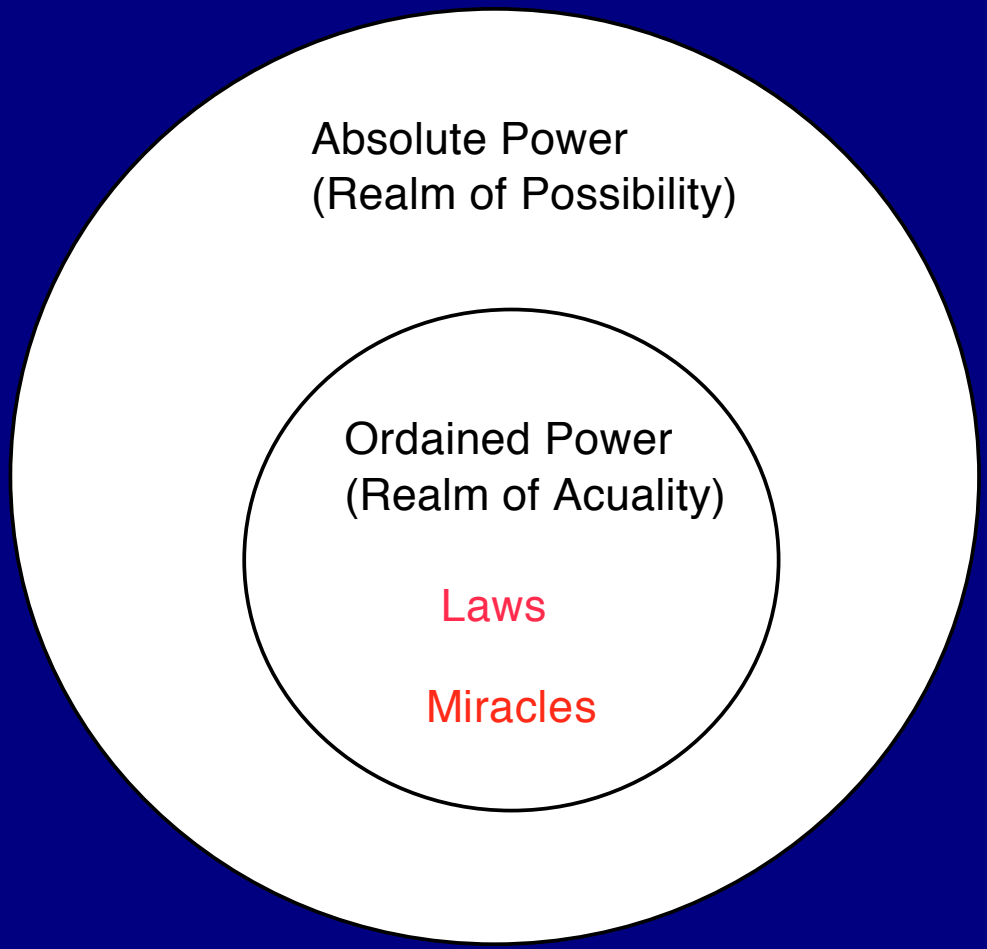
In the mean time. . .

- The mechanistic philosophy saw great promise
- Robert Boyle saw it as God's sovereign sustenance

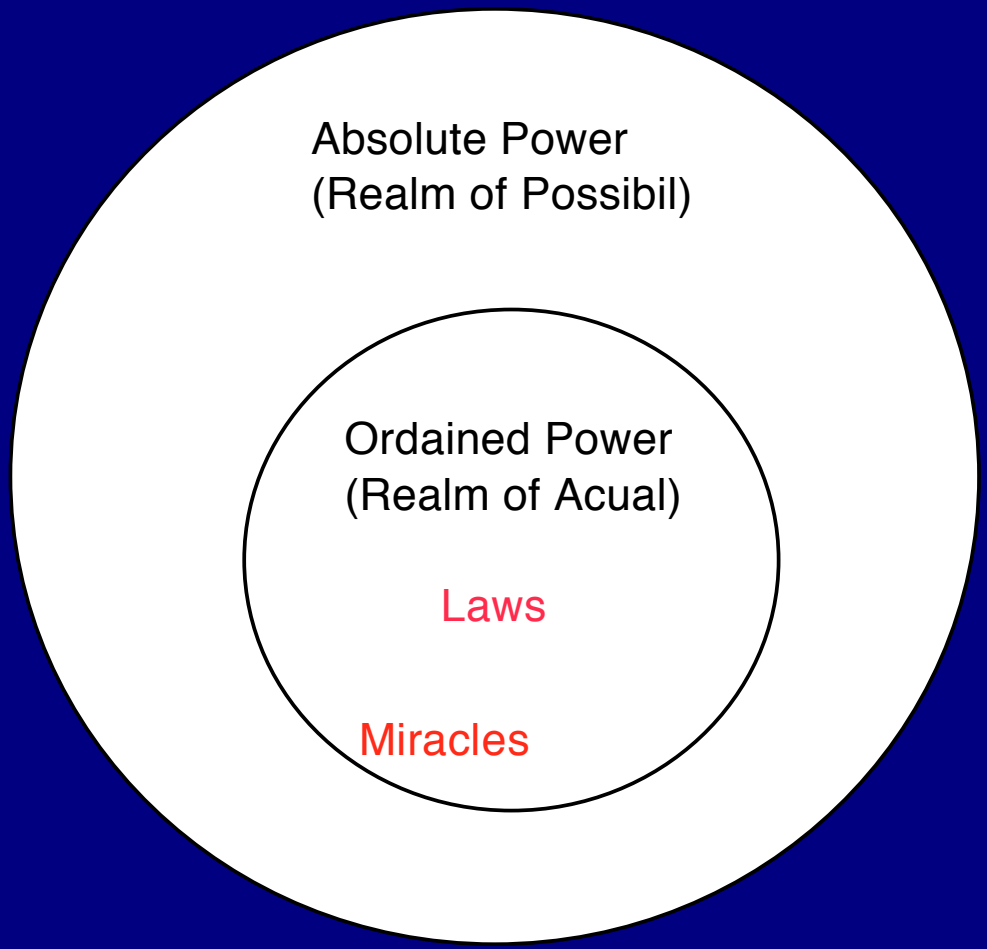
  $\Rightarrow$ a Christian view of science

But by the nineteenth century the mechanistic universe no longer needed God. And the view of the world had changed forever.

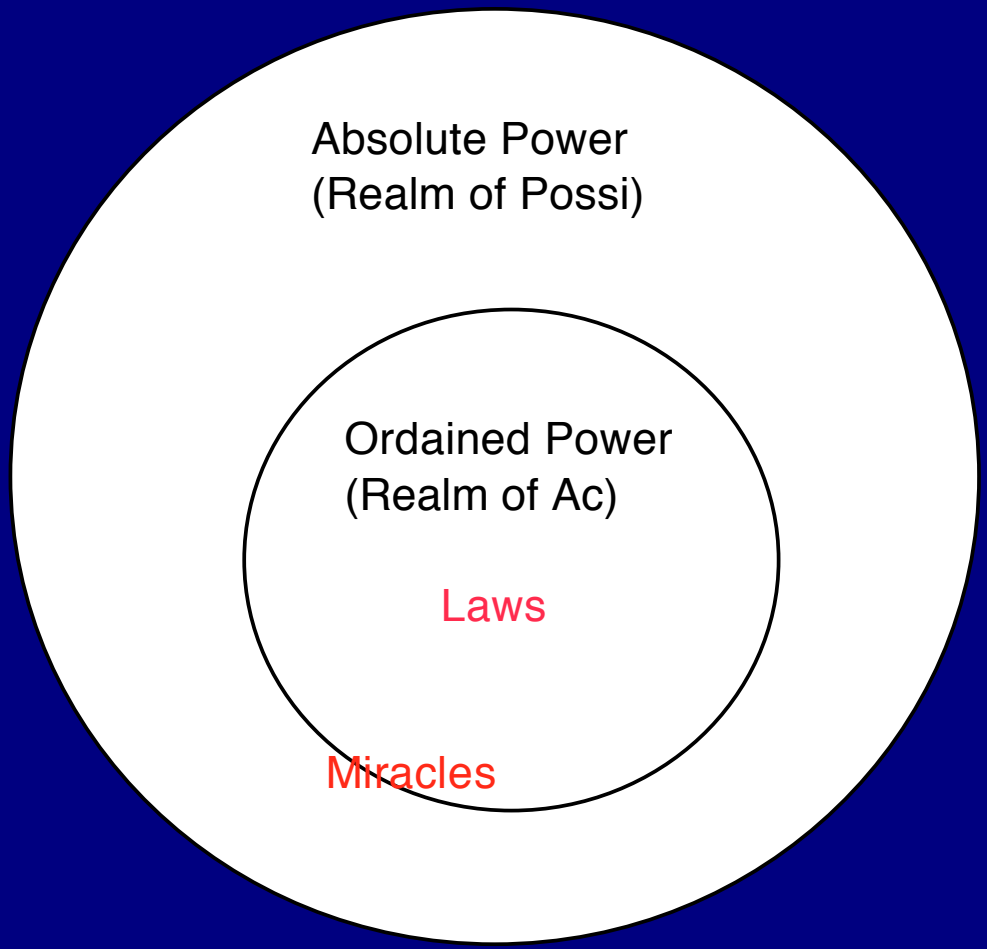
A mechanistic philosophy



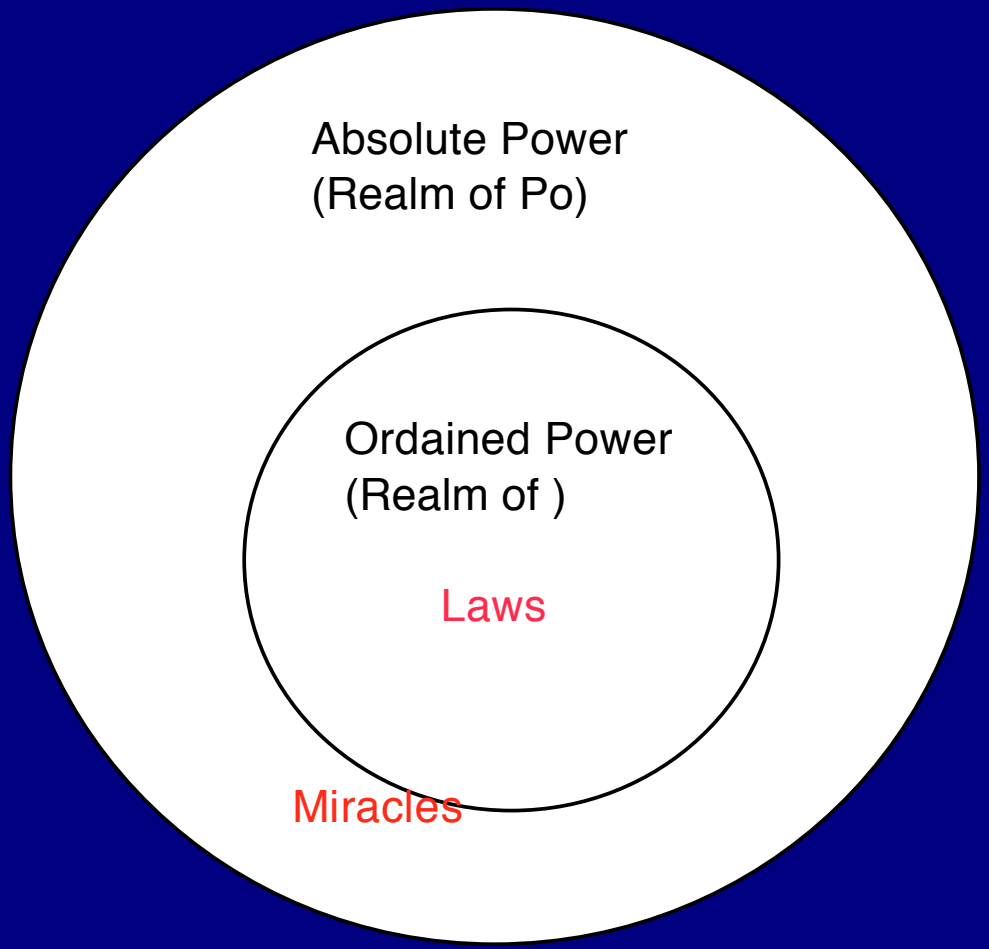
A mechanistic philosophy



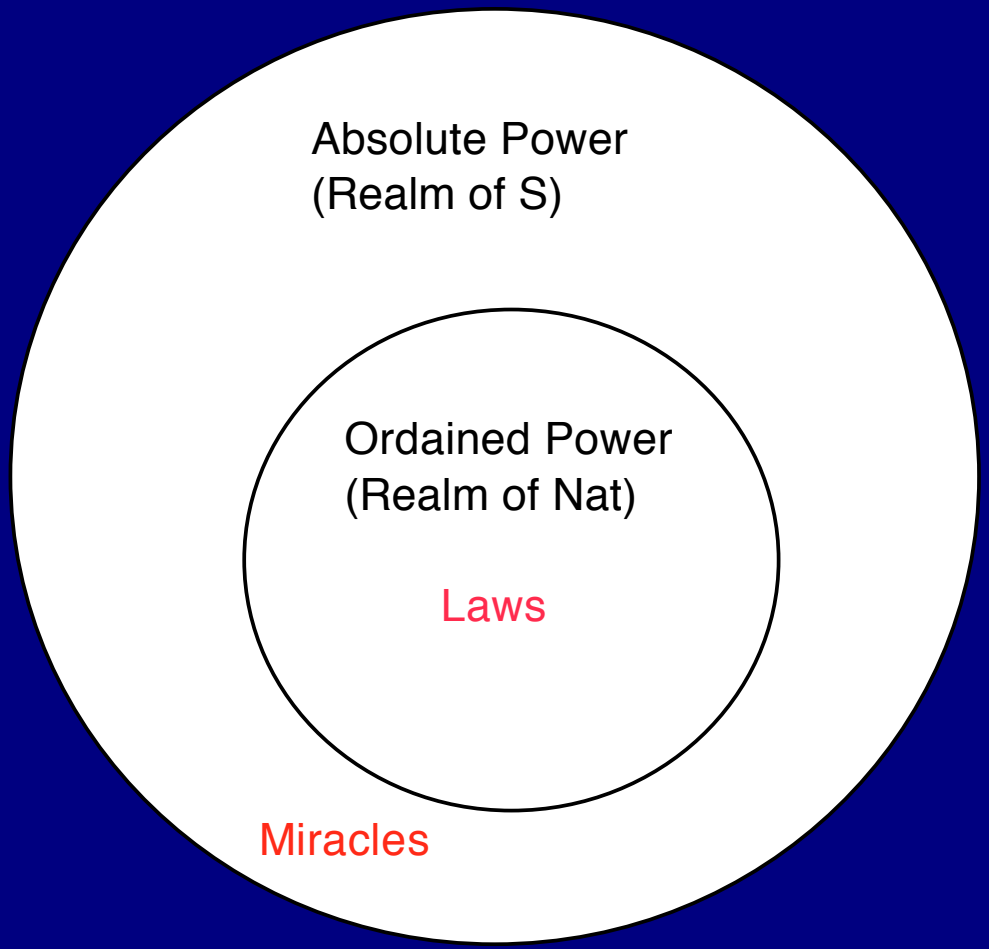
A mechanistic philosophy



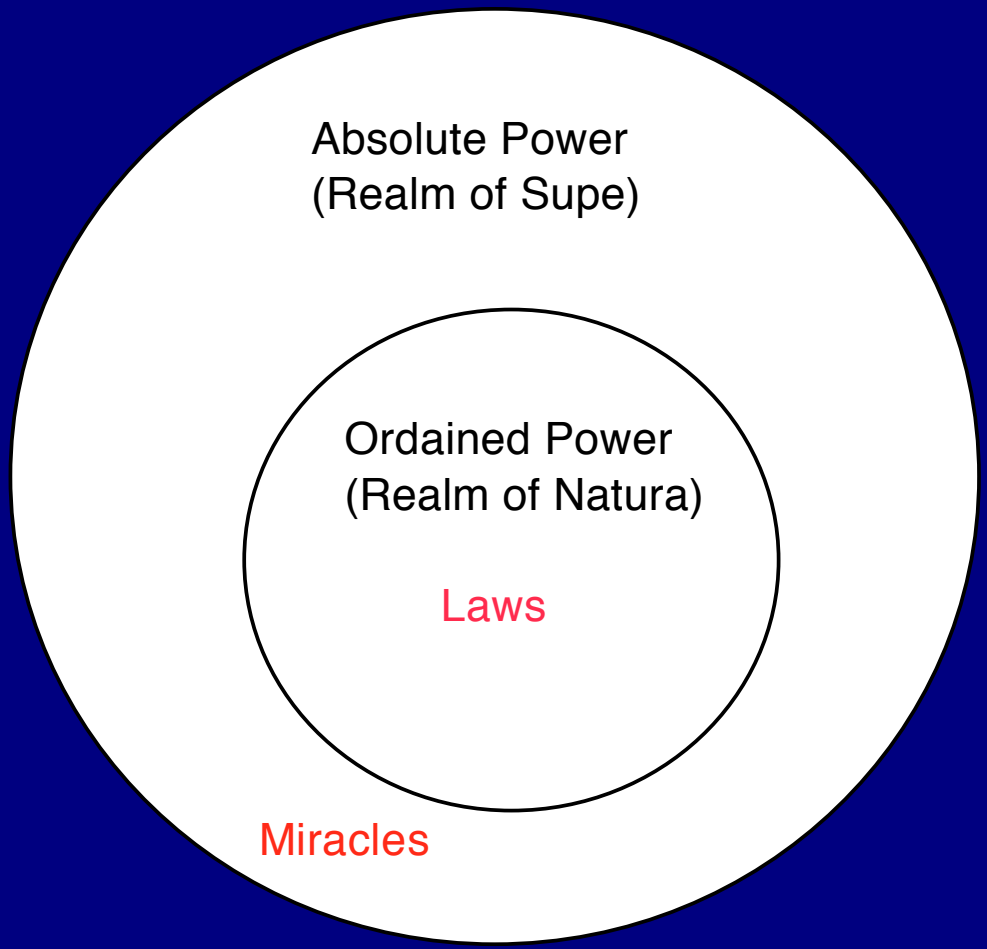
A mechanistic philosophy



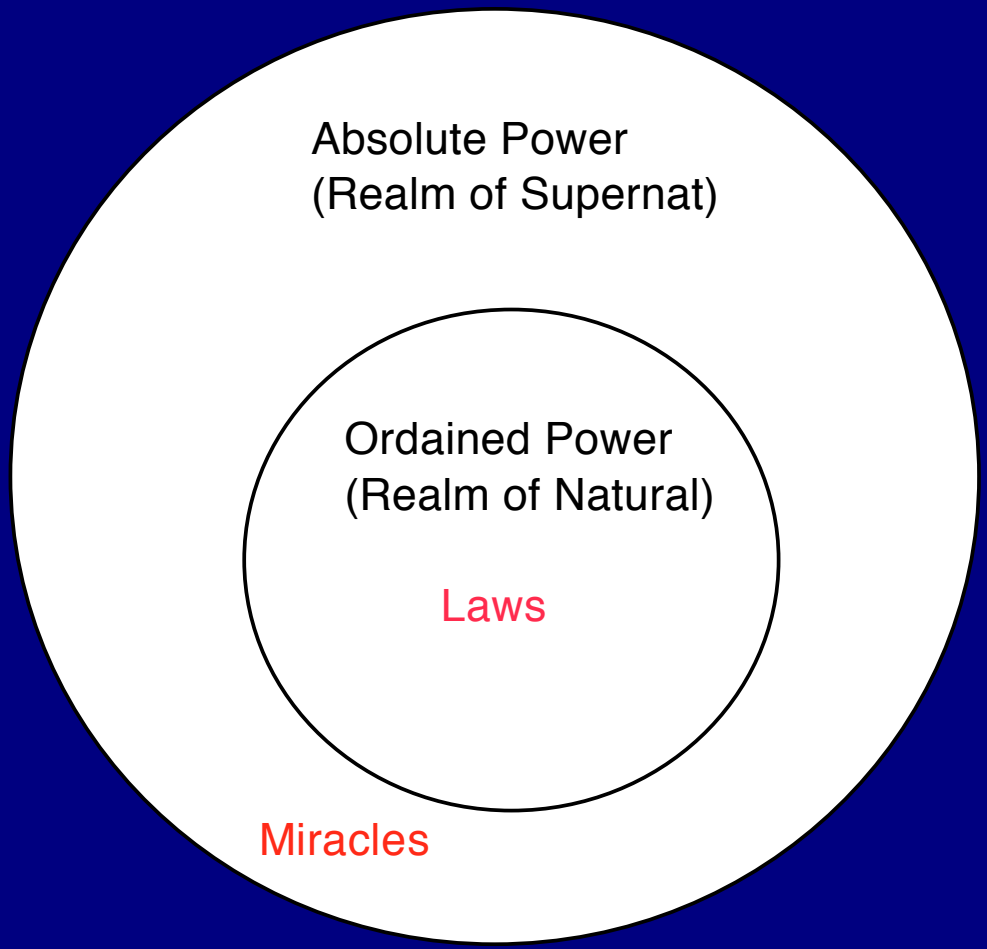
A mechanistic philosophy



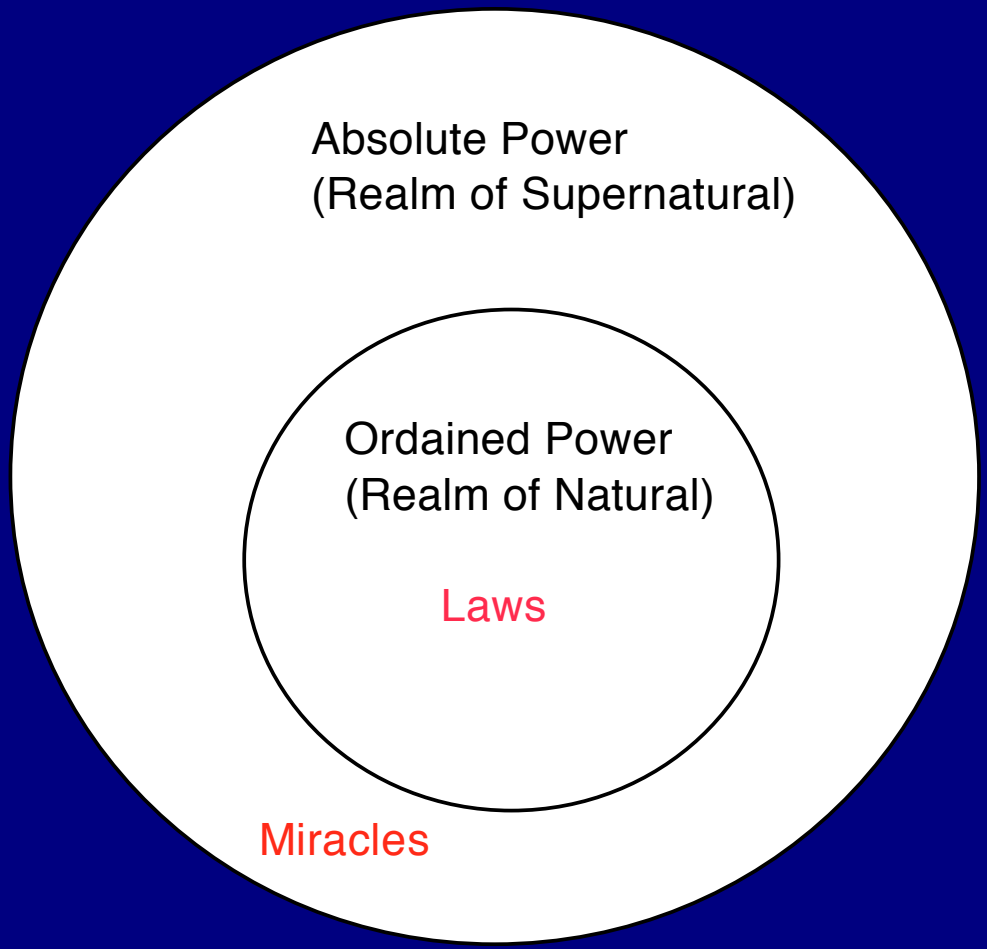
A mechanistic philosophy



A mechanistic philosophy



A mechanistic philosophy



Tendencies from Mechanistic View

- Tendencies
  - dualistic thinking

Tendencies from Mechanistic View

- Tendencies
  - dualistic thinking — God separated from sustenance of creation

Tendencies from Mechanistic View

- Tendencies
  - dualistic thinking — God separated from sustenance of creation
  - Creation “works automatically” like a machine

Tendencies from Mechanistic View

- Tendencies
  - dualistic thinking — God separated from sustenance of creation
  - Creation “works automatically” like a machine
  - God removed from creation

Tendencies from Mechanistic View

- Tendencies
  - dualistic thinking — God separated from sustenance of creation
  - Creation “works automatically” like a machine
  - God removed from creation
    $\Rightarrow$a deist habit of the mind

Tendencies from Mechanistic View

- Tendencies
  - dualistic thinking — God separated from sustenance of creation
  - Creation “works automatically” like a machine
  - God removed from creation
    $\Rightarrow$a deist habit of the mind
    with perhaps “supernatural” intervention

Summary

If there is no dualism between God's action in the universe, there is no clear separation between the "natural" and the "supernatural."

Summary

If there is no dualism between God's action in the universe, there is no clear separation between the "natural" and the "supernatural." There are only regularities and possible deviations from those regularities.

Summary

If there is no dualism between God's action in the universe, there is no clear separation between the "natural" and the "supernatural." There are only regularities and possible deviations from those regularities. Both are being worked out according to God's purposes.

Summary

If there is no dualism between God's action in the universe, there is no clear separation between the "natural" and the "supernatural." There are only regularities and possible deviations from those regularities. Both are being worked out according to God's purposes.
Therefore, there is no clear category called "natural" for methodological naturalism to be limited to.

Summary

If there is no dualism between God's action in the universe, there is no clear separation between the "natural" and the "supernatural." There are only regularities and possible deviations from those regularities. Both are being worked out according to God's purposes.
Therefore, there is no clear category called "natural" for methodological naturalism to be limited to.
(It could merely be saying that science is only good at studying regularities.)

Outline

- A scientist's reaction to methodological naturalism
- The Demarcation Problem
- The Natural/Supernatural dualism
- Mere Science
- The Feynman Integrity Principle
- Some remarks about education

Mere Science

If there is no definition (back to the demarcation problem), we are left with just the enterprise of science as it actually operates.

Mere Science

If there is no definition (back to the demarcation problem), we are left with just the enterprise of science as it actually operates. To do cultural science across different religions and worldviews, we have some things in common, e.g.:

Mere Science

If there is no definition (back to the demarcation problem), we are left with just the enterprise of science as it actually operates. To do cultural science across different religions and worldviews, we have some things in common, e.g.:

- The world “out there”

Mere Science

If there is no definition (back to the demarcation problem), we are left with just the enterprise of science as it actually operates. To do cultural science across different religions and worldviews, we have some things in common, e.g.:

- The world “out there”
- Some common convictions (“there exist regularities,” “we trust our logic,” “our senses are reliable,” . . .

Mere Science

If there is no definition (back to the demarcation problem), we are left with just the enterprise of science as it actually operates. To do cultural science across different religions and worldviews, we have some things in common, e.g.:

- The world “out there”
- Some common convictions (“there exist regularities,” “we trust our logic,” “our senses are reliable,” . . .
- A common social network which supports the enterprise

Mere Science

If there is no definition (back to the demarcation problem), we are left with just the enterprise of science as it actually operates. To do cultural science across different religions and worldviews, we have some things in common, e.g.:

- The world “out there”
- Some common convictions (“there exist regularities,” “we trust our logic,” “our senses are reliable,” . . .
- A common social network which supports the enterprise
- A common ethic of scientific integrity

Mere Science

If there is no definition (back to the demarcation problem), we are left with just the enterprise of science as it actually operates. To do cultural science across different religions and worldviews, we have some things in common, e.g.:

- The world “out there”
- Some common convictions (“there exist regularities,” “we trust our logic,” “our senses are reliable,” . . .
- A common social network which supports the enterprise
- A common ethic of scientific integrity

There are also differences

Mere Science

If there is no definition (back to the demarcation problem), we are left with just the enterprise of science as it actually operates. To do cultural science across different religions and worldviews, we have some things in common, e.g.:

- The world “out there”
- Some common convictions (“there exist regularities,” “we trust our logic,” “our senses are reliable,” . . .
- A common social network which supports the enterprise
- A common ethic of scientific integrity

There are also differences

- No agreement about a definition of science

Mere Science

If there is no definition (back to the demarcation problem), we are left with just the enterprise of science as it actually operates. To do cultural science across different religions and worldviews, we have some things in common, e.g.:

- The world “out there”
- Some common convictions (“there exist regularities,” “we trust our logic,” “our senses are reliable,” . . .
- A common social network which supports the enterprise
- A common ethic of scientific integrity

There are also differences

- No agreement about a definition of science
- Different worldviews or foundational convictions

Mere Science

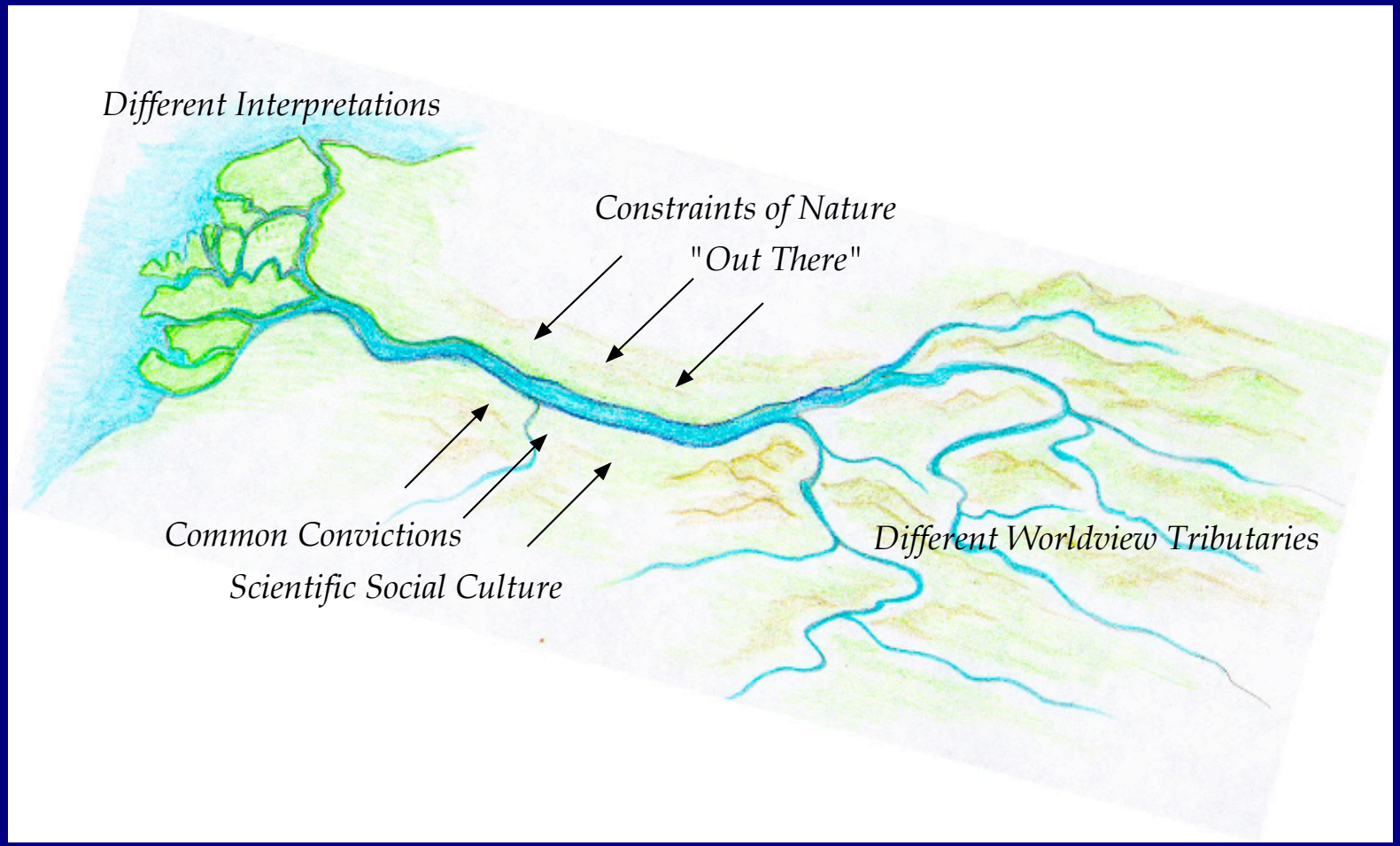
If there is no definition (back to the demarcation problem), we are left with just the enterprise of science as it actually operates. To do cultural science across different religions and worldviews, we have some things in common, e.g.:

- The world “out there”
- Some common convictions (“there exist regularities,” “we trust our logic,” “our senses are reliable,” . . .
- A common social network which supports the enterprise
- A common ethic of scientific integrity

There are also differences

- No agreement about a definition of science
- Different worldviews or foundational convictions $\Rightarrow$different judgment calls

The River of Cultural Science



Outline

- A scientist's reaction to methodological naturalism
- The Demarcation Problem
- The Natural/Supernatural dualism
- Mere Science
- The Feynman Integrity Principle
- Some remarks about education

Feynman on Science

Another of the qualities of science is that it teaches the value of rational thought, as well as the importance of freedom of thought the positive results that come from doubting that the lessons are all true. You must here distinguish—especially in teaching—the science from the forms or procedures that are sometimes used in developing science. It is easy to say, “We write, experiment, and observe, and do this or that.” You can copy that form exactly. But great religions are dissipated by following form without remembering the direct content of the teaching of the great leaders. In the same way it is possible to follow form and call it science but it is pseudo-science. In this way we all suffer from the kind of tyranny we have today in the many institutions that have come under the influence of pseudoscientific advisers.

The Pleasure of Finding Things Out, p. 186

Feynman on Science

When someone says science teaches such and such, he is using the word incorrectly. Science doesn't teach it; experience teaches it. If they say to you science has shown such and such, you might ask, "How does science show it—how did the scientists find out—how, what, where?" Not science has shown, but this experiment, this effect, has shown. And you have as much right as anyone else, upon hearing about the experiments (but we must listen to *all* the evidence), to judge whether a reusable conclusion has been arrived at.

In a field which is so complicated that true science is not yet able to get anywhere, we have to rely on a kind of old-fashioned wisdom, a king [sic] of definite straightforwardness. I am trying to inspire the teacher at the bottom to have some hope, and some self-confidence in common sense, and natural intelligences. The experts who are leading you may be wrong.

The Pleasure of Finding Things Out, pp. 187-8

Feynman on how to fool ourselves

We have heard a lot from experience about how to handle some of the ways we fool ourselves. One example: Milikan measured the charge on an electron by an experiment with falling oil drops and got an answer which we know not to be quite right. It's a little bit off, because he had the incorrect value for the viscosity of air. It's interesting to look at the history of measurements of the charge of the electron, after Millikan. If you plot them as a function of time, you find that one is a little bigger than Millikan's, and the next one's a little bigger than that, until finally they settle down to a number which is higher.
The Pleasure of Finding Things Out, pp. 211

Feynman on how to fool ourselves

Why didn't they discover that the new number was higher right away? It's a thing that scientists are ashamed of–this history–because it's apparent that people did things like this: When they got a number that was too high above Millikan's, they thought something must be wrong–and they would look for and find a reason why something might be wrong. When they got a number closer to Millikan's value, they didn't look so hard. And so they eliminated the numbers that were too far off, and did other things like that. We've learned those tricks nowadays, and now we don't have that kind of disease.
The Pleasure of Finding Things Out, pp. 211

Feynman Integrity Principle

But there is *one* feature I notice that is generally missing in Cargo Cult Science [pseudo-science]. That is the idea that we all hope you have learned in studying science in school—we never explicitly say what this *is*, but just hope that you catch on by all the examples of scientific investigation. It is interesting, therefore, to bring it out now and speak of it explicitly. It's a kind of scientific integrity, a principle of scientific thought that corresponds to a kind of utter honesty—a kind of leaning over backwards. For example, if you're doing an experiment, you should report everything that you think might make it invalid–not only what you think is right about it: other causes that could possibly explain your results; and things you thought that you've eliminated by some other experiment, and how they worked—to make sure the other fellow can tell they have been eliminated.

The Pleasure of Finding Things Out, p. 209

Feynman Integrity Principle

Details that could throw doubt on your interpretation must be given, if you know them. You must do the best you can if you know anything at all wrong, or possibly wrong–to explain it. If you make a theory, for example, and advertise it, or put it out, then you must also put down all the facts that disagree with it, as well as those that agree with it. There is also a more subtle problem. When you have put a lot of ideas together to make an elaborate theory, you want to make sure, when explaining whet it fits, that those things it fits are not just the things that gave you the idea for the theory but that the finished theory makes something else come out right in addition.
In summary, the idea is to try to give *all* of the information to help others to judge the value of your contribution; not just the information that leads to judgment in one particular direction or another.

The Pleasure of Finding Things Out, pp. 209-10

Feynman Integrity Principle (private version)

But this long history of learning how to not fool ourselves—of having utter scientific integrity—is, I'm sorry to say, something that we haven't specifically included in any particular course that I know of. We just hope you've caught on by osmosis. The first principle is that you must not fool yourself—and you are the easiest person to fool. So you have to be very careful about that. After you've not fooled yourself, it's easy not to fool other scientists. You just have to be honest in a conventional way after that.

The Pleasure of Finding Things Out, pp. 211-12

Feynman Integrity Principle (public version)

I would like to add something that's not essential to the scientist, but something I kind of believe, which is that you should not fool the layman when you're talking as a scientist. . . . [not talking about morals in general] . . . I'm talking about a specific, extra type of integrity that is not lying, but bending over backwards to show how you're maybe wrong, that you ought to do when acting as a scientist. And this is our responsibilty as scientists, certainly to other scientists, and I think to laymen.
The Pleasure of Finding Things Out, pp. 212

Feynman Integrity Principle

Feynman Integrity Principle

- The principle implies that when there are disagreements, we should get down to the nitty gritty of details.

Feynman Integrity Principle

- The principle implies that when there are disagreements, we should get down to the nitty gritty of details.
- Where differences arise, we should be prepared to tell each other why we made certain judgments at each stage.

Feynman Integrity Principle

- The principle implies that when there are disagreements, we should get down to the nitty gritty of details.
- Where differences arise, we should be prepared to tell each other why we made certain judgments at each stage.
- Science doesn't become public until it can be convincingly shared.

Feynman Integrity Principle

- The principle implies that when there are disagreements, we should get down to the nitty gritty of details.
- Where differences arise, we should be prepared to tell each other why we made certain judgments at each stage.
- Science doesn't become public until it can be convincingly shared.
- There are levels of how public science is, depending on who can be convinced.

Feynman Integrity Principle

- The principle implies that when there are disagreements, we should get down to the nitty gritty of details.
- Where differences arise, we should be prepared to tell each other why we made certain judgments at each stage.
- Science doesn't become public until it can be convincingly shared.
- There are levels of how public science is, depending on who can be convinced.
- Better ways of communicating can bring more of the science into the more accepted category

Feynman Integrity Principle

- The principle implies that when there are disagreements, we should get down to the nitty gritty of details.
- Where differences arise, we should be prepared to tell each other why we made certain judgments at each stage.
- Science doesn't become public until it can be convincingly shared.
- There are levels of how public science is, depending on who can be convinced.
- Better ways of communicating can bring more of the science into the more accepted category
- (If the science cannot be publicly communicated, perhaps it is not so well founded as we thought!)

Outline

- A scientist's reaction to methodological naturalism
- The Demarcation Problem
- The Natural/Supernatural dualism
- Mere Science
- The Feynman Integrity Principle
- Some remarks about education

Some concluding remarks on education

Concerning education, I hold little hope at present for a real solution. There are too many people with too much at stake.

Some concluding remarks on education

Concerning education, I hold little hope at present for a real solution. There are too many people with too much at stake. One problem is the level of education of high school teachers. They are typically not at the level of making judgments, and barely know “the facts.” So asking them to teach in a certain way is like passing on the form of science with no substance.

Some concluding remarks on education

Concerning education, I hold little hope at present for a real solution. There are too many people with too much at stake. One problem is the level of education of high school teachers. They are typically not at the level of making judgments, and barely know “the facts.” So asking them to teach in a certain way is like passing on the form of science with no substance. Also they do not typically have a sufficient historical understanding of the issues involved, and often pass along fictions because their teachers did. (Would requiring a course in the history and philosophy of science help?)

Suggestions

One thing that comes out of my talk is that passing on a general framework that “scientists believe,” or “scientists say,” is not sufficient.

Suggestions

One thing that comes out of my talk is that passing on a general framework that “scientists believe,” or “scientists say,” is not sufficient.
Suppose we teach “We found this particular fossil in this layer of stratum... Others have found a lot of fossils in this layer of stratum and hardly any in any other layers... Here is how we determine that we think they are such and such and age... ”

Suggestions

One thing that comes out of my talk is that passing on a general framework that “scientists believe,” or “scientists say,” is not sufficient.
Suppose we teach “We found this particular fossil in this layer of stratum.. . . Others have found a lot of fossils in this layer of stratum and hardly any in any other layers.. . . Here is how we determine that we think they are such and such and age.. . . ”
rather than
“Scientists have demonstrated that such and such type of fossil is of such and such an age.”

Suggestions

One thing that comes out of my talk is that passing on a general framework that “scientists believe,” or “scientists say,” is not sufficient.
Suppose we teach “We found this particular fossil in this layer of stratum.. . . Others have found a lot of fossils in this layer of stratum and hardly any in any other layers.. . . Here is how we determine that we think they are such and such and age.. . . ”
rather than
“Scientists have demonstrated that such and such type of fossil is of such and such an age.”
or especially not “Evolutionary theory tells us such and such about this particular fossil.”

Conclusion

Methodological naturalism appears to me to be superfluous for the practice of science.

Conclusion

Methodological naturalism appears to me to be superfluous for the practice of science.

- MN may be useful for philosophers to talk about science.

Conclusion

Methodological naturalism appears to me to be superfluous for the practice of science.

- MN may be useful for philosophers to talk about science.
- MN doesn't seem to accomplish other tasks set out for it.

Conclusion

Methodological naturalism appears to me to be superfluous for the practice of science.

- MN may be useful for philosophers to talk about science.
- MN doesn't seem to accomplish other tasks set out for it.
- The practice of science (mere science) seems robust enough to take care of those tasks.

Conclusion

Methodological naturalism appears to me to be superfluous for the practice of science.

- MN may be useful for philosophers to talk about science.
- MN doesn't seem to accomplish other tasks set out for it.
- The practice of science (mere science) seems robust enough to take care of those tasks.
- MN seems to me to act more as a smoke screen for other more substantive issues of judgment.

Conclusion

Methodological naturalism appears to me to be superfluous for the practice of science.

- MN may be useful for philosophers to talk about science.
- MN doesn't seem to accomplish other tasks set out for it.
- The practice of science (mere science) seems robust enough to take care of those tasks.
- MN seems to me to act more as a smoke screen for other more substantive issues of judgment.
- Better to focus on why we believe what we do, and where varying interpretations break down than meta-issues

Quote from Lee Smolin

One reason to take these issues public goes back to the debate that took place a few years ago between scientists and “social constructivists,” a group of humanities and social science professors, over how science works. The social constructivists claimed that the scientific community is no more rational or objective than any other community of human beings. This is not how most scientists view science. We tell our students that belief in a scientific theory must always be based on an objective evaluation of the evidence. Our opponents in the debate argued that our claims about how science works were mainly propaganda designed to intimidate people into giving us power, and that the whole scientific enterprise was driven by the same political and sociological forces that drove people in other fields. — *The Trouble with Physics*, pp. xix-xx

Quote from Lee Smolin

One of the main arguments we scientists used in that debate was that our community was different because we governed ourselves according to high standards — standards that prevented us from embracing any theory until it had been proved, by means of published calculations and experimental data, beyond the doubt of a competent professional.

Quote from Lee Smolin

One of the main arguments we scientists used in that debate was that our community was different because we governed ourselves according to high standards — standards that prevented us from embracing any theory until it had been proved, by means of published calculations and experimental data, beyond the doubt of a competent professional. As I will relate in some detail, this is not always the case in string theory.
— *The Trouble with Physics*, pp. xix-xx

Quote from Lee Smolin

Of course, we do have to exercise caution. Not all evidence said to support a view is solidly based. Sometimes the claims invented to support a theory in trouble are just rationalizations. I recently met a lively group of people standing in the aisle on a flight from London to Toronto. They said hello and asked me where I was coming from, and when I told them I was returning from a cosmology conference, they immediately asked my view on evolution. “Oh no,” I thought, then proceeded to tell them that natural selection had been proved true beyond a doubt. They introduced themselves as members of a Bible college on the way back from a mission to Africa, one purpose of which, it turned out, had been to test some of the tenets of creationism.

Quote from Lee Smolin

As they sought to engage me in discussion, I warned them that they would lose, as I knew the evidence pretty well. “No,” they insisted, “you don’t know all the facts.” So we got into it. When I said, “But of course you accept the fact that we have fossils of many creatures that no longer live,” they responded, “No!”

Quote from Lee Smolin

As they sought to engage me in discussion, I warned them that they would lose, as I knew the evidence pretty well. “No,” they insisted, “you don’t know all the facts.” So we got into it. When I said, “But of course you accept the fact that we have fossils of many creatures that no longer live,” they responded, “No!”

“What do you mean, ‘no’? What about the dinosaurs?”

Quote from Lee Smolin

As they sought to engage me in discussion, I warned them that they would lose, as I knew the evidence pretty well. “No,” they insisted, “you don’t know all the facts.” So we got into it. When I said, “But of course you accept the fact that we have fossils of many creatures that no longer live,” they responded, “No!”

“What do you mean, ‘no’? What about the dinosaurs?”

“The dinosaurs are still alive and roaming the earth!”

Quote from Lee Smolin

As they sought to engage me in discussion, I warned them that they would lose, as I knew the evidence pretty well. “No,” they insisted, “you don’t know all the facts.” So we got into it. When I said, “But of course you accept the fact that we have fossils of many creatures that no longer live,” they responded, “No!”

“What do you mean, ‘no’? What about the dinosaurs?”

“The dinosaurs are still alive and roaming the earth!”

“That’s ridiculous! Where?”

Quote from Lee Smolin

As they sought to engage me in discussion, I warned them that they would lose, as I knew the evidence pretty well. “No,” they insisted, “you don’t know all the facts.” So we got into it. When I said, “But of course you accept the fact that we have fossils of many creatures that no longer live,” they responded, “No!”

“What do you mean, ‘no’? What about the dinosaurs?”

“The dinosaurs are still alive and roaming the earth!”

“That’s ridiculous! Where?”

“In Africa.”

Quote from Lee Smolin

As they sought to engage me in discussion, I warned them that they would lose, as I knew the evidence pretty well. “No,” they insisted, “you don’t know all the facts.” So we got into it. When I said, “But of course you accept the fact that we have fossils of many creatures that no longer live,” they responded, “No!”

“What do you mean, ‘no’? What about the dinosaurs?”

“The dinosaurs are still alive and roaming the earth!”

“That’s ridiculous! Where?”

“In Africa.”

“In Africa? Africa is full of people. Dinosaurs are really big. How come no one has seen one?”

Quote from Lee Smolin

As they sought to engage me in discussion, I warned them that they would lose, as I knew the evidence pretty well. “No,” they insisted, “you don’t know all the facts.” So we got into it. When I said, “But of course you accept the fact that we have fossils of many creatures that no longer live,” they responded, “No!”

“What do you mean, ‘no’? What about the dinosaurs?”

“The dinosaurs are still alive and roaming the earth!”

“That’s ridiculous! Where?”

“In Africa.”

“In Africa? Africa is full of people. Dinosaurs are really big. How come no one has seen one?”

“They live deep in the jungle.”

Quote from Lee Smolin

"Someone would still have seen one. Do you claim to know someone who has seen one?"

Quote from Lee Smolin

"Someone would still have seen one. Do you claim to know someone who has seen one?"

"The pygmies tell us they see them every once in a while. We looked and we didn't see any, but we saw the scratch marks they make eighteen to twenty feet up on the trunks of trees."

Quote from Lee Smolin

"Someone would still have seen one. Do you claim to know someone who has seen one?"

"The pygmies tell us they see them every once in a while. We looked and we didn't see any, but we saw the scratch marks they make eighteen to twenty feet up on the trunks of trees."

"So you agree they are huge animals. And the fossil evidence is that they live in big herds. How could it be that nobody but these pygmies have seen them?"

Quote from Lee Smolin

"Someone would still have seen one. Do you claim to know someone who has seen one?"

"The pygmies tell us they see them every once in a while. We looked and we didn't see any, but we saw the scratch marks they make eighteen to twenty feet up on the trunks of trees."

"So you agree they are huge animals. And the fossil evidence is that they live in big herds. How could it be that nobody but these pygmies have seen them?"

"That's easy. They spend most of their time hibernating in caves."

Quote from Lee Smolin

"Someone would still have seen one. Do you claim to know someone who has seen one?"

"The pygmies tell us they see them every once in a while. We looked and we didn't see any, but we saw the scratch marks they make eighteen to twenty feet up on the trunks of trees."

"So you agree they are huge animals. And the fossil evidence is that they live in big herds. How could it be that nobody but these pygmies have seen them?"

"That's easy. They spend most of their time hibernating in caves."

"In the jungle? There are caves in the jungle?"

Quote from Lee Smolin

"Someone would still have seen one. Do you claim to know someone who has seen one?"

"The pygmies tell us they see them every once in a while. We looked and we didn't see any, but we saw the scratch marks they make eighteen to twenty feet up on the trunks of trees."

"So you agree they are huge animals. And the fossil evidence is that they live in big herds. How could it be that nobody but these pygmies have seen them?"

"That's easy. They spend most of their time hibernating in caves."

"In the jungle? There are caves in the jungle?"

"Yes, of course., why not?"

Quote from Lee Smolin

"Caves big enough for a huge dinosaur to enter? If the caves are so big, they should be easy to find, and you can look inside and see them sleeping."

Quote from Lee Smolin

"Caves big enough for a huge dinosaur to enter? If the caves are so big, they should be easy to find, and you can look inside and see them sleeping."

"To protect themselves while they hibernate, the dinosaurs close up the mouths of their caves with dirt so no one can tell they're there."

Quote from Lee Smolin

"Caves big enough for a huge dinosaur to enter? If the caves are so big, they should be easy to find, and you can look inside and see them sleeping."

"To protect themselves while they hibernate, the dinosaurs close up the mouths of their caves with dirt so no one can tell they're there."

"How do they close up the caves so well they can't be seen? Do they use their paws, or perhaps they push the dirt with their noses?"

Quote from Lee Smolin

"Caves big enough for a huge dinosaur to enter? If the caves are so big, they should be easy to find, and you can look inside and see them sleeping."

"To protect themselves while they hibernate, the dinosaurs close up the mouths of their caves with dirt so no one can tell they're there."

"How do they close up the caves so well they can't be seen? Do they use their paws, or perhaps they push the dirt with their noses?"

At this point, the creationists admitted they didn't know, but they told me that "biblical biologists" from their school were in the jungles now, looking for the dinosaurs.

Quote from Lee Smolin

"Caves big enough for a huge dinosaur to enter? If the caves are so big, they should be easy to find, and you can look inside and see them sleeping."

"To protect themselves while they hibernate, the dinosaurs close up the mouths of their caves with dirt so no one can tell they're there."

"How do they close up the caves so well they can't be seen? Do they use their paws, or perhaps they push the dirt with their noses?"

At this point, the creationists admitted they didn't know, but they told me that "biblical biologists" from their school were in the jungles now, looking for the dinosaurs.

"Be sure to let me know if they bring out a live one," I said, and went back to my seat.