THE IDREOS LECTURES
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Given By
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FROM NOTHING UNTIL NOW:
FAITH IN THE NATURAL HISTORY OF OUR UNIVERSE

and

SPIRITUALITY OR SUPERSTITION:
CRITERIA FOR QUALITY IN SCIENCE, RELIGION AND POPULAR CULTURE

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Dr. Andreas Idreos
FOREWORD

Dr Andreas Idreos was born in Cyprus in 1917 and studied medicine at the University of Athens, specialising in pharmacology. During the Second World War, he was evacuated from Greece by the British to Crete and then to Egypt, and joined the medical services of the British Middle East Refugee and Relief Administration. During 1942 he accompanied civilians engaged in work for the war effort to Jerusalem and was Commandant of the evacuee centre. In 1943, after El Alamein, he returned to Cairo and worked with the Middle East Supply Centre under British and American commands. In 1944 he joined the United Nations Relief and Rehabilitation Administration (UNRRA) and after the war was stationed in Greece in the medical division of UNRRA. In 1949 he was awarded a World Health Organisation fellowship to study the implementation of the National Health Service at the Ministry of Health in London. From 1951 to 1978, Dr Idreos served as a Senior Staff Member of the World Health Organisation in Geneva.

During his years working for the World Health Organisation, Dr Idreos had the opportunity to visit a great number of countries and became aware that a common denominator that could help bring about more understanding between people of different cultures was science. However, another important factor was religion, which also aims to alleviate suffering. He became convinced that the interaction of science and religion offers the best premise for providing a better understanding of the nature of being and a dynamic concept for creating a basis of unity and cooperation.

In 1990 Dr Idreos founded the Idreos Lectures in Science and Religion in Oxford, as this University is one of the oldest and most prestigious in the world. The Lectures have been held annually at Harris Manchester College and have been so successful, due to the eminent speakers, that Dr Idreos decided to make an endowment to the University of Oxford for the Andreas Idreos Professorship in Science and Religion. Sadly he died last October but he had completed the endowment and the University has approved the Chair, and it is expected that the first Professor will be appointed in 1999.

The following two outstanding lectures by Professor Drees of Twente and Vrije Universiteit, Amsterdam, will therefore be the last in the series as the work in this field will be continued by the Andreas Idreos Professor in Science and Religion.
Dr Willem B. Drees
Let me begin by expressing my gratitude to Rev. Ralph Waller and the trustees of the Idreos Charitable Trust for inviting me to deliver the Idreos Lectures this year and for the hospitality shown to us at Harris Manchester College. Let me also express my thanks to Ms. Idreos for the interest shown by her and Dr. Andreas Idreos in supporting intellectually responsible reflections on science and religion in order to understand our reality and to strengthen our moral and spiritual values.

TWO LECTURES

I will offer two lectures, one today and one tomorrow. Let me begin with a few words on the way these two lectures fit together. In my opinion, there are two different important questions as challenges to religious traditions, namely ‘What is the world like?’ and ‘How do you know?’ New knowledge separates us from the medieval synthesis, but ideas about the nature of knowledge have changed as well. Thus, we face two different challenges.

One is to articulate a view of the world which is consistent with scientific ideas. It is this challenge that most people think about when they hear about ‘science and theology’. One might think of the conflicts associated with the names of Galileo and Darwin, as well as of reconciliatory approaches as offered by previous Idreos lecturers such as Arthur Peacocke, Ian Barbour and Sir John Polkinghome.

The second challenge is due to the critical attitude of science. The question ‘how do you know’ deservedly haunts religious believers, including those who offer constructive proposals regarding religion in the context of natural history. This second issue is, to some extent, tomorrow’s topic. How do we distinguish between good, bad and bogus? What one considers to be spiritually important another considers superstition or nonsense. Are there any criteria for quality, also when we consider phenomena such as the X-files, astrology and alternative medicine? Today I will offer one particular interpretation, my own. Today a creation story; tomorrow the more serious business of the Ten Commandments.
The subtitle 'Faith in the natural history of our Universe' can be read in three different ways. First it is an expression of confidence in science: I do believe that current ideas about the natural history of our universe are by and large right. The astrophysical universe evolved from a hot and dense Big Bang some fifteen billion years ago; the Solar System was formed some five billion years ago, and humans emerged through a Darwinian evolutionary process as one species of primates.

Secondly, 'Faith in the natural history of our universe' poses an anthropological issue in human evolutionary history: How did myths, rituals and more articulated forms of religious beliefs emerge in our natural history? What roles did religions have in this context? This is an issue that should interest secular students of human nature as well.

Thirdly, 'Faith in the natural history of our universe' is about the challenge how to maintain with integrity a relevant sense of religious faith, given what is known about the natural history of our universe and of our religions.

I will speak on all three issues, more or less in this order, while reflecting upon a personal poetic interpretation of the natural history of our own universe. It is a kind of 'creation story'. Humans have told each other stories for many thousands of years. Stories about the origin of their world, of the hunting grounds of their tribe, of the origins of women and men, of the discovery of wheat and of fire, of the sun and the moon. Creation stories expressed how humans understood themselves in relation to their environment. Such ancient myths are sometimes compared to science, as if the issue were their factual correctness, say about a worldwide flood or creation in seven days. When creation stories are judged in this way, these narratives of a distant past are ready for the dustbin, or perhaps a museum of cultural history. 'That is how people in the past thought about these things, but now we know better.'

However, creation stories are also expressions of what moved people, what excited them, hurt them, made them feel grateful. In that sense, they go beyond
the limitations of their own world view. We can recognize them, since we face similar challenges. Wonder about existence, dependence and responsibility: these are themes which can and should be articulated as well in the language of our time.

This lecture is an attempt to reflect on our place and task in the light of the sciences. We need images, but imaginative language may be misleading. In my opinion, the critical attitude of modern culture is a great gift. Thus, this lecture is also an explication and justification of the ‘creation story’.

**Mystery**

There was a time
when there was no time,
when time was not yet.

That time
when there was no time
is a horizon of not knowing
a mist where our questions fade
and no echo returns.

Then,
in the beginning,
perhaps not the beginning,
in the first fraction of a second,
perhaps not the first fraction
of the first second,
our universe began
without us.

**A beginning in time?**

One might think of the beginning of the universe as one thinks about the beginning of a work of art. At some moment *in* time it was made. Time may be imagined as the ticking of a clock, an infinite extension of moments. At one of those moments my life started, over a billion seconds ago. Long before that the Earth was formed. And at again an earlier moment, some fifteen billion years ago, the universe began.
If it started at some point in time, what preceded the universe? Before the work of art, there were the artist and her materials. Before my conception there were my parents. What was there before the universe? This question was raised in a different form already in antiquity. The churchfather Augustine discussed around 400 C.E. the question what the Eternal One was doing that infinity of ages before there was a world. Augustine first makes a joke, effectively saying: ‘Then God created Hell for those who ask such questions’. Then, Augustine attempts to deal seriously with this question. He argues that the question is wrongly posed. The question what God was doing before creating the world, assumes that one can meaningfully speak about ‘before’ even when there is no world. But time is connected to movement: the pendulum of a clock, the rotation of the Earth, the frequency of an atomic oscillation. If there is no clock ticking and no Earth rotating, how could we then say that time passes? Time assumes movement and hence matter. Time is understood by him, in religious terms, as an aspect of creation and not an attribute of God. Augustine thus concludes: ‘If there was no time before heaven and earth, why then ask what You were doing then? For when there is no time, there is no ‘then’.

A BEGINNING OF TIME?

Augustine rejected the idea of creation in time; time was something that came into being with creation, creatio cum tempore. This is also the approach taken by contemporary cosmologists who develop theories about the universe as a whole. Time is related to material processes. In the very early universe, processes were different, and hence the notion of time was too. Perhaps, ‘time’ is not definable. Rather than a sharp boundary, a moment when the initial push was given, there may have been a twilight, like the transition between day and night. ‘Time’ might not be a useful concept when we seek to describe the early universe. That is not a tragedy, nor does it suggest that there is ‘another side’. A concept that is useful for many purposes need not be applicable everywhere. We seem to have to do with ‘a time when time was not yet’, a phase of the universe when our notion of ‘time’ was not applicable. Cosmology challenges us to free ourselves from a way of thinking which comes so naturally to us, namely the view that everything happens in time.

PERSISTENT QUESTIONS

Will we ever answer all questions concerning the early universe? We will see farther, and hence differently, but science will not remove this ‘horizon of not
knowing'; there will always be, in my opinion, 'a mist where our question fades, and no echo returns.'

Our situation is like that of archaeologists: we find traces and clues – and seek to understand the past. In that process, we answer questions and pass on other questions. An architect who constructs a building, decides to use concrete. He has knowledge of the forces that this concrete will be able to withstand. If someone would ask why the forces are as they are, the architect might refer us to an engineer who studies material sciences. This engineer should be able to inform us about the wear and tear of these materials, and how that is rooted in the chemical bonds between the various materials. Perhaps the engineer might even know from which geological layer the sand and cement have come. However, if you go on asking how those layers came to be there, the engineer will refer to a geologist. The geologist can tell a story about the erosion of mountains and sedimentation of sand and stones by rivers. However, if one continues and asks where the silicon and oxygen come from, the chemical elements out of which the sand consists, the geologist will have to say that these were there when the Earth was formed. For further questions, he refers to the astrophysicist. The astrophysicist can tell us about the formation of elements in the interiors of stars and during supernova-explosions. However, the astrophysicist assumes that there is already hydrogen. When we go on with ‘historical’ questions, we come to the turf of the cosmologist, theories about the earliest stages of the universe.

This, in a nutshell, is typical of science: scientists answer questions which belong to their province of expertise, while passing on other questions, about the things they take for granted in their own work. In the end, there are persistent questions about fundamental rules: Why does matter behave the way it actually behaves? Why are the laws of nature the way they are? And there are persistent questions of an historical kind: Where does everything come from? How did it all begin? Such questions arise again and again when a sequence of questions is pursued. They are questions at the boundaries of science, ‘the horizon of not knowing’. Scientists can explain much, but science does not get rid of such questions. The horizon moves, but is not removed.

Questions remain even if physics and cosmology would agree on a complete theory, which explains all known phenomena in a unified, coherent way. Imagine, in a single article one single formula which answers all our questions. But the
article is on a piece of paper; the formula consist of symbols. Thus, there is no answer to the question: Why does reality behave as described here? It is as with a famous drawing of the Belgian artist René Magritte. It is a careful drawing of a pipe, a pipe used for smoking tobacco. Underneath it, he has written 'Ceci n’est pas une pipe’, ‘this is not a pipe’. And he is right. It is an image of a pipe. One cannot fill it with tobacco and if one would attempt to light it, something else happens than when one lights a pipe. There is a difference between an image, how well done, and reality. This is also the case for a good scientific theory. However accurate the theory, the question remains why reality behaves as it does. And there is a traditional philosophical question: Why is there something rather than nothing? There are similar philosophical questions which arise due to science, but are not themselves answered by science. Why is mathematics so effective in describing reality? It is a misguided strategy to inflate problems and puzzles to mysteries. However, the success of science in solving puzzles and problems can itself evoke questions. How can science be so successful? What does that say about humans and about reality?

There are various ways of dealing with persistent questions. The American president Truman is said to have had a sign on his desk saying ‘The buck stops here’. In a company or administration the president cannot avoid responsibility; he has to make a choice if the problem is passed on by others. Scientists, however, do not have to make a choice. They may live with the insecurity of unanswered questions. Faith does not have to cut this Gordian knot either, but can recognize that our explanatory quest is open ended. The physicist Charles Misner expressed this well:

Saying that God created the universe does not explain either God or the Universe, but it keeps our consciousness alive to mysteries of awesome majesty that we might otherwise ignore, and that deserve our respect.

We always work within the limitations of our concepts and ideas and within the limitations of our existence. We never see the universe ‘from outside’, from the perspective of eternity, but always from within the world. That is also a problem when we speak of God; we are within the universe, and suggest to speak about something more encompassing. Our language need not be meaningless, but the situation does require a certain care, a restraint or arrogant certainty.
INTEGRITY

After the beginning,
   perhaps not the beginning,
after the first fraction of a second,
   perhaps not the first fraction
of the first second,
after our universe began,
   still without us,
then
   the universe was
like seething water
   without land and without air,
like a fire
   without wood and without cold.
The universe,
   as small as it was,
created itself space, matter,
   and the cool of the day.

There always will remain questions; existence does not explain itself. However, we should not lose sight of the integrity of the universe, the reliability of phenomena. The universe in its development turns out to behave according to regularities (laws of nature). If the universe is seen as a gift, the present is a complete one; it has its own integrity. It is not a puppet on a string, with someone else pulling the ropes, or an incomplete product that needs supplementation or correction from time to time.

Just as the total charge seems to be zero, with as much positive charge as negative charge, so too might be the total energy zero, with as much positive energy (mass, kinetic energy) as negative energy (binding energy, especially due to gravity). The universe needs no input of charge, mass or energy; the conserved sums might be zero.\(^7\)

This self-sufficiency does not imply that nothing is needed. It assumes a reality which is such that positive and negative charges can come into existence out of a
neutral whole, a reality in which matter can form out of energy. Quantum physics describes brief fluctuations during which two opposites form, for instance a positive and a negative charge. Empty space is like a seething sea, with waves emerging and merging again with the low. After matter has been formed, the universe is still like a seething sea in which combinations of matter are formed and fall apart.

The universe has its own integrity; it stands on its own feet, without a supply of mass, energy or space flowing in from elsewhere. There is no dictator, who occasionally brushes his own laws aside and decides otherwise. The universe develops in its own way.

Responses to this integrity of reality are various. Some see it as a basis for atheism, the conviction that there is no god. In my opinion, this interpretation does not do justice to the mystery of existence (see above). The integrity of the universe does not imply that everything is understood; it is something else than self-sufficiency.

Others see the integrity as a basis for deism, the idea that a god started the universe but is not involved anymore. However, the fundamental limit questions are not questions only about the beginning; they are also about existence as such. The question why the universe is as it is, is not answered merely by saying that this is so since it was yesterday as it was yesterday. It is also necessary that the laws of nature are effective at every moment, that reality has existence at every moment. We can and should take distance from the image of God as an engineer who started the whole business. In the theological tradition God has been referred to as the ‘First Cause’, who is the cause of the ‘secondary causes’, that is, of natural processes. Perhaps we should take even more license from our concepts of time, space and cause. In this context, I prefer to think of God as the Ground of Being, the ground of the natural order and its integrity.
In billions of galaxies
the universe made itself
from dust stars
from stars dust.

Much later,
from dust from stars
from dust
from stars from dust
swirled our Sun
and from leftovers
the Earth, our home.

Thus,

after ten billion years,
there was evening
and there was morning:
the first day.

After some ten billion years, two-thirds of the history of the universe so far, the Earth and the Sun were formed. If we are interested in a religious or a secular view of our lives, the first ten billion years seem unimportant. The utmost limit we already considered, with humans and human cultures not yet to appear onto the scene for a long time. However, by paying attention to this long period without humans we become aware to what extent our existence is dependent upon the larger universe in which we move and have our being.

Stars live and die. A star can be understood as a nuclear fusion reactor kept together by gravity. In its core hydrogen fuses and forms helium. When the hydrogen in the core has been used, the pressure thus generated falls away, and the star will collapse under its own weight. The density and temperature rise and helium nuclei will begin to merge, forming heavier elements such as carbon and oxygen. When the supply of helium is exhausted new fusion processes will take off. In this way, heavier elements are formed inside stars. When the ‘fuel’ inside stars has been converted, the star will collapse under its own weight. This generates a huge amount
of heat, resulting in an explosion. The star will burn very brightly for a few weeks, as if there is a new star in the heavens - this is called a super-nova. During the explosion the elements heavier than iron, such as gold, lead and uranium, are formed and the outer layers of the stars are blown away.

When our Sun came into being the interstellar gas must have been rich in heavier elements. Not only has the Sun traces of these elements, but they also form the basis of planets such as the Earth. And the basis for all life on Earth. Life is dependent upon carbon, oxygen, phosphorus and much more, elements formed through nuclear fusion in stars. We can exist thanks to stars we have never seen. We are not just dust of the earth (Genesis 2:7), but dust from stars from dust from stars from dust.

**LUCK**

Life
began modestly,
undirected,
a history of failing
and occasionally
a small success.

A molecule
carried information
from generation to generation,
history bred purpose,
by chance.

Billions of years later
cells merge,
sex and aging,
death and deception.

A rare
slow lungfish
slithered through the grass;
thus came amphibians to pass.
Successful life
a disaster,
gone
another tide.

From a biological point of view evolution happens, without a purpose. Within the evolutionary process, however, purposiveness has emerged. The eye is for seeing and the kidneys are for filtering blood. These organs have a purpose, a function.

As long as processes are considered at the level of cause and effect, as in physics and chemistry, there is no place for function or purpose. Events happen as they happen. Mutations, small changes in the features of an organism happen. Among the mutations some may be helpful and others disastrous, at least for such an organism in such an environment. The environment is a source of accidental events too: one organism may find useful food, whereas the other starves; one gets eaten, the other escapes.

The combination of accidental mutations and accidents in life results in more than accidental development. Natural selection by the environment is not after some particular purpose, but it does generate differences. Those individuals that happen to have somewhat more suitable properties will on the average do better than those who have slightly less attractive properties. The properties at stake can be quite varied: resistance against drought, alertness, sharper claws, a higher stem so that more light is captured, or a restriction to bare essentials, as in duckweed. Subsequent generations will have properties that are slightly better in tune with the hazards of that environment.

Purposiveness is a consequence of such a selective history. A tree has a long stem because that allows the tree to capture more light - trees are a-social in this respect. A rabbit has eyes on the side because this allows her to see early any predators approaching. Why-questions can properly be asked when we have to do with life which is a product of history. One can ascribe to organs a purpose as their raison d’être - since they are there because similar organs have fulfilled that function reasonably well in previous generations.8

Much could be said about the evolutionary history of life. Let me focus on one aspect, the issue of contingency. How obvious is the result of evolution? Assume
that we would start with a similar initial situation on another planet. Would we see the same development? Would there emerge such nice beings as \textit{homo sapiens} again? Or, to phrase the issue differently, how likely is it that there are similar intelligent and moral beings elsewhere in the universe? Given a suitable planet, would life emerge again? And how likely is it that a subsequent evolution would ever produce beings like us?

Stephen J. Gould, a paleontologist, considers it extremely unlikely that history would ever produce the same result. Even if we were to start a million times again, it still is improbable that beings like humans would emerge again. Gould takes his point of departure in the beginning of the Cambrium, the geological period when life became multicellular. In a particular rock formation of Canada, the Burgess Shale, fossils from this period, some 530 million years ago, have been found. Among them Gould discerns twenty-five different forms of life, each of which could have resulted in a particular kind of animal, such as the insects or the vertebratae. But only four of those twenty-five still have descendants. If some others had survived, life would have been quite different now.\footnote{Gould points to many other transitions when the evolutionary process could have taken a different turn. Among the vertebrates there was a small and insignificant group of lungfish with bones in their fins allowing them to move onto the land; if they had not been there, the vertebrates might have never been able to invade the land. And if some 65 million years ago the impact of a meteorite or comet would not have made an end to the dinosaurs they might still dominate the Earth. They were a successful \textit{form} of life; a disaster and it was over, with new opportunities for other life forms. Not astrologically but biologically we owe our existence to the positions of the planets. And if among the primates in Africa there had not emerged a species with an upright posture, it could be that despite their interesting potential the primates might have been restricted to ecologically marginal species such as the chimpanzee, the bonobo and the gorilla. The human species, \textit{homo sapiens sapiens}, is according to Gould\footnote{a tiny twig on an improbable branch of a contingent limb on a fortunate tree.}

The accidental is not the consequence of a fundamental process, as perhaps in quantum physics. Rather, the issue is the coming together of different, independent
chains of cause and effect. We consider it luck if we meet someone on the street and thereby collect a debt, even if both parties have good reasons, independently of each other, to be there. The current outcome of evolution is the result of many consecutive steps, each one intelligible but in their multitude and variety as a whole unpredictable.

The contingent, accidental nature of our existence does not diminish its value. Rather on the contrary, our contingent existence is something special. Consciousness, playing with ideas and reflecting upon our own activities and upon possibilities which are not actualized, has risen to a level not present on Earth before. That life and sentience came out of matter need not diminish their value either; rather, these amazing facts should raise our esteem for the potential of matter. The contingent character of the process is also a basis for freedom and responsibility, for it affirms the role of small local influences on the course of events; the future will be the product of history.

**HUMANITY**

Yesterday

a few million years ago

the East Side Story:

apes

hunt and call.

Sticks, stones, fire

eating from the tree of knowledge

the tree of good and evil,

power, freedom,

responsibility:

Beasts became us

more was delivered than ordered,

more than we can bear?

All objects around us, including ourselves, seem to consist of the stuff described by chemists in the periodic table of the elements. This stuff is further understood by physicists to consist of elementary particles and forces, and beyond that is assumed to consist of quantum fields, superstrings, or whatever. As the "whatever" indicates,
our knowledge has not reached rock bottom yet. Our view of reality cannot be articulated from a fundamental ontology upwards, even if one holds everything to consist of the entities studied by physics.

Money exists as precious metals, paper, electronic codes, and shells; it would neither be feasible nor helpful to deal with economic processes in terms of the physical characteristics of money. The taxonomy of a science describing higher level phenomena need not carve up the world in the same way as physics. Furthermore, the environment plays an essential role; a particular state of the computer would not correspond to my account unless interpreted as such by the employees of the bank.

Conceptual and explanatory non-reductionism is tenable. Even more, in the context of current science one can defend that there are genuinely new objects with new properties, even though they have arisen out of other objects. Higher level properties are not just a combinatorial consequence of lower level properties. A hydrogen molecule (H₂) is a new entity, with properties of its own which are not a combination of the properties of the hydrogen atoms taken separately. When such a molecule is formed the lower level entities no longer exist — and hence, cannot be the locus of the causal efficacy of the molecule. Complex entities do not consist of lower level entities ("consist of" in a combinatorial sense), but rather replace them.¹¹ Along such lines, philosophers of science may clarify how we can understand emergent entities and properties as real and causally efficacious, even if they are "consisting of" more simple ones — just as future entities will be real and causally efficacious even when they are produced by present ones.¹²

If we accept reductionism, one may also ask 'So what?' Pain does not become less real or painful when its physiological basis is unravelled. Once one understands how a concept from a higher level of description is understood in terms of the lower level the original term may be superfluous (in the rare case of an exhaustive type-type reduction), but is not thereby dismissed. If the temperature of a gas can be identified with its mean kinetic energy, there is nothing wrong with saying that the temperature of the air in my room is currently 20 degrees Celsius.
Social behaviour towards children, nephews and nieces is evolutionary intelligible; genes that promote such behaviour promote the spread of copies of themselves in the next generation. Support of one’s partner is also evolutionary intelligible; the shared investment in children results in common interests. And for beings with a reasonable memory, helping one’s neighbours is also evolutionary intelligible. After all, another time I may request help from my neighbour. Helping a stranger may perhaps improve one’s standing in the community. Social behaviour may also be to the advantage of my group, and thus prudential. We may benefit even more when we invest less in the common cause than it appears, since then we profit in the benefits without sharing to the full extent in the burden. The evolution of deception is, from this point of view, intertwined with the evolution of social behaviour as prudent behaviour, as a form of ‘enlightened self-interest’. Does such an evolutionary view of morality undermine its moral status? Is our morality nothing but the form acquired by our natural intuitions and emotions, our preferences and dislikes, a form of genetic selfishness? In my opinion the answer can be ‘No’.

Means can be used for new purposes. The fingers did not evolve to play a piano, but they can be used to play the piano. In evolutionary history new uses of old organs can be found again and again. Intelligence and communication, brains and language will have been used for more than the four essential F’s: feeding, fighting, fleeing and reproducing. The ‘more’ that was delivered allows morality to be genuinely moral. For it is intelligence that allows us to rethink our own behaviour. We may, for instance, discover that we are inclined ‘naturally’ to treat men and women differently. However, by becoming aware of this we can also act against the apparently self-evident ‘natural’. Communication may also contribute. Imagine that once an offended hominid asked a fellow hominid ‘Why do you behave thus?’ The one who is challenged could not appeal to self-interest or emotions. In the presence of others he was challenged to justify the behaviour in question with arguments that would be recognizable and acceptable to the others present. Due to reflection and communication, natural behaviour guided by enlightened self-interest may have been revised. The social context of our lives may have pushed towards universality, one of the hallmarks of morality.

Moral behaviour is not always easy, as the apostle Paul was well aware of. We have been endowed with intuitions and emotions. That is already a mix of nature
and culture. Furthermore, we are occasionally open to reasons, to argument. Thoughts spread faster than genes. There is no reason to assume that the biological basis always overrules the effects of culture. Thanks to the emergence of culture as a second kind of heritage, alongside the genetic one, and thanks to the capacity for reflection and to the impulse to public justification, we are not victims of our evolutionary heritage. We are biological beings, but as these particular biological beings we have a moderate amount of freedom with respect to our biological drives. We therefore also have responsibility.

**RELIGIONS**

We now get to the second meaning of 'Faith in the natural history of our Universe', the role of religions in our evolutionary history.

Religion
- cement of the tribe
- response to power
- of mountains,
- the storm, the sea,
- birth and death,
- power as large as gods.

Yesterday
- ten thousand years ago
- Abel was killed by his brother,
- we farmers eat ashamed our bread,
- the earth cries, forever red?

A new age,
- a prophet warns
- king and people,
- a carpenter tells
- 'a man
- who fell among robbers,
- was cared for
- by an enemy'.
Religions are not merely by-products of human evolution; they may have been essential to it. Myths, stories, transfer the values of a group from generation to generation. Religions may have emerged as cement of the tribe; without such religions humans would not have evolved in the way they have.\textsuperscript{14}

Religions also emerged in confrontation with the power of storms, of the sea and the mountains. When confronted with unpredictable events we still use animistic language. We even do so in our dealings with technological products; the car ‘does not want’ to start and the computer ‘does not understand us’. Animistic language seems outdated; lightning is no longer seen as thrown down upon us by wrathful gods. But still we humans use such figures of speech, also in a more positive version as talking with trees, discerning ‘a plan’ and denying meaningless contingency.

All those millennia religions were not oriented towards change or redemption, but served to maintain the social and cosmic order. Priests and the powerful were on the same side. The social order seemed obvious and unchangeable. In the context of the community one affirmed one’s own position in life and accepted death.

The last millennium before the beginning of our era a new attitude emerged, and with it new types of religion. Karl Jaspers, who introduced this scheme of cultural history, spoke of the Axial Age. In Greece there were great philosophers such as Socrates, Plato and Aristotle. In Israel prophets such as Isaiah, Jeremiah, Amos and Hosea were active. In Persia there was Zoroaster, in India Gautama (Buddha) and Mahavira, the founder of Jainism, and in China Confucius and Lao Tze (Taoism). The world religions arose.

One of the fruits of the changes in these centuries was a greater sense of individual responsibility. Not the continuation of the tribe or community with its fixed positions and role expectations is primary, but the individual and what he or she could become. Our earthly existence is felt lacking. In the religious myths it is confronted with something different, something better. In Hinduism this is redemption out of the cycles of earthly existence, in Buddhism it is Nirvana and Enlightenment. Among Jews the expectation of a Kingdom of God develops; in Christianity this is expressed also with a more individual focus as expectations about redemption and eternal life.

Whereas earlier tribal religions affirmed one’s place in the course of events, the world religions also nourished prophetic protest. The prophets in Israel weren’t
fortune-tellers divining the future. They were individuals who came forward to speak to the king and the people about their doings and dealings. Prophetic texts announce judgement on those who do not live rightly. And they speak of hope where the people may lose confidence. The prophetic religiosity integrates criticism and longing. Faith is no longer primarily about powers that we do not understand or control; it also is the confrontation with situations in reality which we do not want to accept. This introduces a dualist element in religious images, a contrast between what is and what should be, whether articulated in the pair of earth and heaven, the city of man and the city of God, the present and the Kingdom, nature and grace, or one of many other ways. These developments are well exemplified in the stories told by Jesus. The well known story of the Good Samaritan is about an individual who goes beyond the boundaries of his own group, who takes care, rather than accepting fate.

CRITICAL THINKING

Look,
measure
and count,
challenge knowledge
and authority!
Enlightenment
way out of immaturity.

The rise of the natural sciences is, with hindsight, one of the greatest transitions in human history, perhaps comparable only to the emergence of agriculture. It is a pinnacle of self-critical thinking. It is the basis for a huge expansion of knowledge, sometimes resulting in fundamental changes of ideas.

The Bible, too, became an object of scientific research. The texts were written down by humans. When? By whom? Why did they say it this way? Is the text a unity or more like a mosaic with pieces of different kinds? What is legend and what reliable? The Christian tradition was the first one that embarked on critical self-examination.

Critical thinking not only manifests itself in scientific and historical inquiry, but also in a different view of society. The circle of respectable persons expanded. Citizens acquired political rights, women too. Slavery was abandoned. Changing
political attitudes manifested themselves in the French Revolution with its slogan of liberty, equality and brotherhood (1789) and in the Universal Declaration of Human Rights (1948). Such ideals have never been realized fully. The Twentieth Century has seen horrendous atrocities. Still, public statements and, for instance, the public support for Amnesty International exemplify a social and political development of major importance. Resistance against cruelty towards animals signals a further widening of the circle in this respect.

We have discovered something valuable. The rise of the natural sciences, of historical consciousness, of the political ideals of freedom and equality and the social role of democratic societies are not merely products of a particular culture, exchangeable for insights and ideals from any other culture or epoch. They are morally inspired moments in the development of a critical attitude with respect to moral claims and purported knowledge, in the development of opposition against totalitarian regimes and power based on violence and arbitrary authority. Scientific insights, and even more attitudes, contributed to ‘higher’ forms of life. ‘Higher’ not in a biological sense, but spiritual, as growth in moral sensibility and critical thinking, toward ourselves and others.

RESPONSIBILITY

With us
we carry
a box
full of stories
Between
hope and fear
our neighbours
life
here on Earth,
between
hope and fear
the great project
of thought
and compassion
on a road
of freedom.
We carry with us on life’s journey a box with stories and letters, our heritage. Part of our heritage is the material out of which we are made, dust from stars. Part of our heritage is the set of recipes which were tested in evolutionary history and are encoded in DNA. Our bodies, our brains with their potential, our responses: everything is a product of history. Again and again we have to do with our biological heritage. That is not a burden, but the basis of our existence. Thanks to our biological heritage we may feel and think.

The fruits of our cultural history are part of our heritage, too. Human languages embody knowledge about the world. Different legal and political systems and etiquette show how people may live together. Religious traditions with their rituals and stories are part of our cultural heritage as well. In ‘our box’ we have the critical traditions, the social one of the prophets and the intellectual and political one of modernity.

Not everything that has been wisdom in the past, still is. An unrestricted ‘Be fruitful and multiply’ is no longer wisdom in an age with billions of humans already filling and subduing the Earth. Wisdom is bound to circumstances, and these can change. Wisdom is also related to a goal; the wisdom offered by physics is quite insignificant when facing the death of a friend.

The situation has changed. Agriculture was the beginning of humans re-creating their environment. Science and technology have expanded our capacity to modify our environment so that it better serves our needs. Hence, humans increasingly face an enormous responsibility. Are we beings who can take responsibility?

We can transcend immediate needs, desires and responses, reflect upon them, consider the circle of others concerned, correct ourselves. Therein lies freedom. Free will is not indeterminacy but the remarkable fact that we humans can be guided by ideals, by a life plan. This is not unassailable; we can forego the opportunity for reflection, lose ourselves in an addiction. The great project of thinking and compassion on a road of freedom is a project that we have to take on, again and again. A song of praise for creation is appropriate but there is no seventh day when the acquired treasures can be put on display in a glass case.
Let me bring this lecture to a close. I see two ways of approaching theology in the context of our current knowledge.

There is room for metaphysical reflection as indicated in the first few sections. Humans are not only beings enmeshed in their particular situations. They also speculate about the world beyond their local environment. In the sciences, such speculations have reached remarkable heights, resulting in the understanding of many phenomena and the discovery of new phenomena. In the speculations of science, we reach beyond particularities, although the achievements of science are acquired through the study of details and not through reflections of a more general kind. In philosophical and theological thinking there is a drive towards universality and abstraction which resembles the move in science from particular contexts to an understanding which covers different contexts. Wondering humans may receive answers from science, but beyond the answers arise further questions which science does not answer. The open place may be referred to in religious language, seeing God as the Ground of Being, as giving existence.

There are also the religious traditions, that is the collections of rituals, myths and practices which function in particular communities. Each tradition offers a particular language, with certain metaphors and concepts. Other languages may be equally adequate and beautiful but I still have one particular native tongue, namely Dutch, which I consider very adequate and beautiful. I also intend to respect all other people as being, in principle, worthy of interest and engagement but I am involved in more intense personal bonds with only a few. I also know that there is a variety of religious traditions, and I intend to grant them all initial respect. However, there is a particular tradition which I have encountered most intensely, and that is the Christian one, in a liberal protestant form which was strongly influenced by the European Enlightenment. I have found elements of value in this tradition – in most of its parables and in some of its hymns, in a few of its representatives and in many articulations of ideals of justice nourished by it.

No tradition is beyond dispute and development. We do not have to accept our own tradition, or any other, without critical scrutiny as a yes-or-no package deal. Change is characteristic of our history and there is no need to exclude religious traditions from it.
One reason for change from an evolutionary point of view is that the circumstances have changed, and that therefore models of good life or forms of worship may have to change. Such is certainly the case when we consider the human condition today: we are vastly more numerous, stand in a fundamentally different relation to nature; we are more powerful than before, and we are confronted with neighbours across the globe. In relation to such changes, traditional models and metaphors may be employed differently, or they may be understood as they always have been but this may now be inappropriate to the circumstances.

Not only have our circumstances changed, but so have our moral and spiritual sensitivities, for example with respect to conflicts between ethnic or religious groups, slavery, or cruelty to animals. We evaluate traditions also by the moral and spiritual life they support.

One more reason, not the most important one, is the cognitive credibility of a tradition. If the images which support the way of life are not recognizable, or if the claims by which the way of life is justified have become incredible, then that too challenges the religious tradition, though more indirectly than challenges to the appropriateness of the circumstances of the way of life and to its moral and spiritual adequacy.

Granted that we may have to discard some traditions or may have to modify them, why would one keep alive any tradition? In my opinion, the reason is that they are useful and powerful. They are useful and powerful, not only for unreflective moments and persons, but also for reflective and well informed persons. No human is only a rational being who could entertain all his motives and desires consciously and intentionally; the structure of our brains is such that much goes on which is not dealt with consciously. This is the risk involved in religious forms of behaviour (since so much cannot be scrutinized consciously) and the reason for their importance: through religious metaphors and forms of behaviour we address reality especially in a way which confronts us with ideals, with what ought to be, with a vision of a better world, or with images of a paradiacal past or an ultimate comforting presence.

In my view, the two approaches can complement each other. They can be seen as independent contributions which might be integrated in a larger world-view. The openness expressed in the limit-questions may induce a sense of wonder and
gratitude about the reality to which we belong. Such a cosmological approach might primarily be at home with a mystical form of religion, a sense of unity and belonging, as well as dependence upon something which surpasses our world. The functional view of religion offers some opportunities for a prophetic form of religion, with a contrast between what is the case and what is believed ought to be the case. Religious wisdom is to some extent independent from the actual situation which we face, and may thus serve as an external reference, an apparent Archimedean position outside the actual situation, in reference to which one might judge human decisions in the actual situation. However, such ‘prophetic’ wisdom transcends the current situation, but is tied to an earlier one. Hence, it may not be adequate in the new situation, where consequences may be different; blind application is never justified.

Our knowledge and our capacity for knowledge have arisen in the midst of life, and if we are to use them anywhere at all, it will have to be there. They allow us to wonder about that which transcends and sustains our reality, but all the time we wander in the reality in which we live, move, and have our being; to its future we contribute our lives.

NOTES

1. This lecture is based on Willem B. Drees, Van Niets tot Nu: Een wetenschappelijke scheppingsvertelling (Kampen, NL: Kok, 1996), of which a German translation will appear this Fall as Vom Nichts zum Jetzt: Eine etwas andere Schöpfungsgeschichte (Hannover: Lutherisches Verlagshaus, 1998). An English version is in preparation. The main ideas are developed at greater length in Drees, Beyond the Big Bang: Quantum Cosmologies and God (La Salle, IL: Open Court, 1990) and Drees, Religion, Science and Naturalism (Cambridge University Press, 1996).


4. E.g., S.W. Hawking, A Brief History of Time (1988) and the essays by C.J. Isham in Physics, Philosophy and Theology: A Common Quest for Understanding, eds. R.J. Russell, W.R. Stoeger, G.V. Coyne (Vatican City State: Vatican


7. That the total energy might be zero, was suggested by E.P. Tryon, Is the Universe a vacuum fluctuation? Nature 246 (1973), 396-397.


12. Whereas advocates of a Whiteheadian ontology seem to believe that certain important characteristics cannot emerge, and hence have to be present in basic entities or events, my version of naturalism assumes that genuine life, experience, consciousness and morality can emerge.


LECTURE 2

SPIRITUALITY OR SUPERSTITION: CRITERIA FOR QUALITY IN SCIENCE, RELIGION AND POPULAR CULTURE

INTRODUCTION: THE NEED FOR CRITERIA

A student of evangelical persuasion submitted a paper. At the Resurrection, when Jesus became Jesus Christ, something of cosmic significance happened, and she had the idea that it might be that physics's most famous formula, \( E = mc^2 \), only then became true to reality; before Christ there was one C less, \( E = mc \).

I rejected the paper. The student felt I had rejected her religious beliefs. I had not been sufficiently tolerant of religious and cultural differences, but rather followed my own prejudices.

Teachers, editors, reviewers of books, organizers of conferences, members of juries, and buyers and readers of books - we all make decisions about quality. Students and authors disagree; On what grounds do you reject my ideas? Is it merely that it happens to be different from your own preferences and beliefs, your cultural or academic biases? What someone considers genuine spirituality, another judges to be superstition; what one considers nonsense, the other thinks the most sensible idea.

This lecture is about the great struggle between such 'poor underdogs' who produce ideas and texts and the powerful 'established authorities' who can publish, appoint, give prizes, invite for a lecture, or decide to leave a thinker in the limbo of aspiring academics.

My lecture is not merely about the struggle between these contending parties, for it is also about the reception of science and about the future of religious thought. What can be sold as genuine spirituality in an age of science and what should be dismissed as superstition?
There would not be genuine problems if there were widely accepted criteria which are explicit and independent of particular beliefs. If criteria are dependent upon one's own convictions, they do not help in evaluating proposals which express other positions. How can a teacher say to a student that a paper is not acceptable while still being tolerant of the variety of religious beliefs?

However, universally accepted criteria for quality do not exist, nor can they exist - just as a simple and univocal demarcation between science, bad science and pseudo-science is impossible. The discussion on criteria is not independent from that on content; particular convictions about the nature of science and the character of theology are always involved.

Reflection on quality should be prominent on our agenda. There is an enormous increase in quantity in 'science and religion', but how to promote quality? How to avoid the multiplication of nonsense?

We should avoid 'nonsense', since it adversely affects the academic credibility of 'science-and-religion'. Some who hear that I write on 'science and religion' think I am trying to prove that the Bible has been right after all. Others associate work on science and spirituality with Von Däniken's *Chariots of the Gods*. If these are one's 'friends', one does not need enemies.

In popular culture there is the persistence of magic as well as the emergence of fundamentalist versions of religious traditions. In my opinion these are not private aberrations. Magical thinking is exemplified by the X-files on television, astrology in magazines, stories about abductions by aliens, and millenialist sects. Such ideas affect how people see their lives and approach their problems. Alternative medicine is a public issue since public money is involved in health care. Besides, pseudo-science and pseudo-religion raise unrealistic expectations, with which science is also confronted.

Thus, both in the academic and in the public domain we need to distinguish genuine spirituality from superstition. In my opinion, every sincere author on science and theology should feel sympathy for the organized sceptics and secular humanists, since their criticisms are often made for the sake of rationality, integrity and prudence.
In choosing this topic and expressing my affinity with sceptical thinking I openly confess my positive appreciation of the Enlightenment, of the modern habit of questioning claims. Science is not merely a collection of facts (knowledge), but it is also an attitude of putting claimed knowledge to test. The critical attitude towards authority and speculation is, in my opinion, an issue of intellectual, moral and spiritual sincerity. It is the attempt to differentiate between genuine spirituality and superstition.

One risk is that one's criteria reflect nothing but one's prejudices. And we humans easily apply double standards. The standards by which we judge others we do not apply to ourselves. In order to be sincere, we need to abide with the following symmetry-requirement.

**Symmetry requirement**

We need to apply the same criteria to our own convictions as to the X-files. Or, to use a biblical phrase, there is no greater command than the following one

'You shall criticize yourself as your neighbour,

or, even more appropriate,

'For with the judgement you pronounce you will be judged, and the measure you give will be the measure you get.'

1. **GENERAL CRITERIA**

There are criteria which are typical of academic writing in general. As a first approximation, one might distinguish between three stages in the development of an intellectual position, namely the attempt to achieve conceptual clarity on a particular claim, the discussion on its truth, and the implications if it were true. If you discuss the issue of free will in relation to determinism, you need to clarify how you understand 'determinism' and 'free will', you have to consider whether determinism is true of our world, and you may want to consider the implications of your conclusions regarding determinism for our legal and moral responsibilities. At each of these three stages there are particular risks involved as well. Let us consider these in turn.
CONCEPTUAL CLARITY

Conceptual clarity is extremely important. As Bertrand Russell said "Clearly our first problem must be to define the issue, since nothing is more prolific of fruitless controversy than an ambiguous question." Papers which use their central terms in a vague and ambiguous way, often fail to make a case for anything.

However, demanding definitions can also be demanding too much too early; it is impossible to define all terms in a discussion, and still get started. As J.L. Mackie wrote, "a demand for definition can be a sophistic device for preventing the discussion of substantive issues."

Definitions may also be premature. For instance, one might define determinism and then analyze whether theories of physics describe the universe in a deterministic way. But if the definition assumes notions such as 'now' and 'the future', it may not be applicable once one moves on from Newtonian physics to relativity theory. A precise definition of 'determinism' cannot precede the analysis of the truth of determinism in the context of particular theories. Concepts become sharper in focus when one discusses their adequacy or truth, or their implications. This is certainly the case when it comes to theological terms, such as for instance 'God'. An initial definition may be useful, but ideas about the meaning of 'God' should be open to development in the course of subsequent arguments.

Sometimes a definition is formulated in such a way as to end the exploration even before it has been started. A physicist once explained to me that he did not believe in transcendence, since the universe is all there is. By definition there cannot be anything beyond the universe. He is right; once one defines reality as all that is real, one cannot speak of entities which are real but do not belong to reality. However, his definition does not rule out notions of transcendence which are about transcendence beyond our material, natural, ordinary or observable reality. The definition does not decide any substantial issues but only articulates how he intends to use the term 'universe' - not as referring to the largest natural system but in a very encompassing metaphysical way.

Actually this physicist wanted to do more than to say how he used the term 'universe'. For he went on to explain that physics and cosmology offer us the basic picture of what the universe is like, namely a universe of matter and fields, space and time. He then concluded that there could not be any transcendence beyond space and time, beyond material reality.
In this conversation he used the term ‘universe’ in two different ways, namely as a synonym for ‘all there is’ as well as a term referring to the largest system science studies. This is an example of the more general problem of using the same terminology in different contexts. Words like energy, force, complementarity and chaos are used within scientific contexts but also in a more general discourse. The conceptual continuity thus suggested may not be sufficient to carry the argument. A shift from one domain to another involves continuities and discontinuities in meanings.

One more disruptive practice is the invention of a jargon of one’s own or the introduction of a variety of particular abbreviations. This may give the impression of technicality even though the creative language is doing nothing but obscuring the presentation.

ARGUMENTS

As far as I am concerned today, judging the quality of arguments is a fairly easy issue. There is a rich literature on mistakes and errors, some of which are known as fallacies. Let me list a few demands regarding argumentation.

Clarity about sources is the first thing I ask of my students. It allows others the opportunity to scrutinize the point of departure. An argument will not be better than the material put into it warrants. To be honest about sources is demanded by the Eighth Commandment:

VIII. Neither shalt thou steal.

Fair attribution and fair descriptions of ideas and positions of others, quoting them fairly, is an intellectual, moral and spiritual obligation.\(^5\)

Clarity about the character of the argument itself is also desirable. Arguments come in degrees, from the verbal and imaginative to the formal, for instance with the help of modal logic. Especially tricky is the reliance on analogies and metaphors. Stories and thought experiments are also risky, as there may well be hidden assumptions about the nature of the world. In science the basic hidden assumption is that the world of the thought experiment is like our world (ceteris paribus) except for the specific elements modified in the thought experiment. However, in philosophy such hidden assumptions may be far less clear, while playing nonetheless a major role.\(^6\) The least interesting argument is an argument by verbal association,
which almost never delivers the goods suggested. The kind of argument should also be appropriate to the aim of an essay. Does it seek to prove something, or show its plausibility? This demands more of the way science is used than an argument for possibility, whereas a contribution which seeks to evoke an attitude, is again different in style and structure.

Furthermore, one would hope that well known fallacies are avoided. One of them is the genetic fallacy, assuming that the truth of a belief follows from its origin. Another is the naturalistic fallacy, moving unwarrantedly from ‘is’ statements to ‘ought’ statements. Quite often one also finds the fallacies of division and of composition, assuming that what is said of the whole can be said of each individual, and vice versa. For instance, since a house is made of stones, and stones do not provide shelter, a house cannot provide shelter. If humans were only made of atoms, and atoms don’t think, humans would not be able to think - and hence there must be something else. We also suffer in our business from a fallacy of misplaced concreteness, assuming that where there is a word there must be an entity to which the term applies, rather than, for instance, a relation or a property.

As for original language, so too for length: it can hide problematic aspects; 'a very long discussion is one of the most effective veils of fallacy; ... a fallacy which when stated barely ... would not deceive a child, may deceive half the world if diluted in a quarto volume'.

**Implications**

In my experience it is often the case that ideas about the consequences of a particular point of view drive the opposition to it. If determinism would be true, morality goes down the drain. If evolution is true, morality is also lost. If we accept materialism as an ontology, we will end up with materialism as a social attitude. If sociobiology is accepted, we end up with political fatalism.

'You will know them by their fruits' (Matthew 7: 16) is a wise statement, especially when social, moral or spiritual issues are involved. But the fruits of an investigation need not be pleasing; to close one’s eyes to information regarding problematic or tragic aspects of reality indicates a lack of courage and wisdom. Furthermore, to judge ideas by assumed fruits is a mistake which may too easily inhibit a fair analysis of the ideas and of their fruits.
Let me conclude this first section with a warning inspired by the second of the Ten Commandments:

II. You shall not bow to a graven or written image as if it has caught univocally in its construction and argumentation everything that is in heaven above, or that is on earth beneath, or that is in the water under the earth.

One-track papers assume homogeneity or transparency, taking the meanings of central terms or the character of science or of religion to be clear and univocal whereas multiple meanings are present. This multiplicity of meanings will be explored further with respect to science - which is not merely defined by certain theories, nor by a single method - and to religion - which consists not only of propositional beliefs, but also of attitudes and practices. Avoiding ambiguity or indeterminacy of expressions is desirable, but resolving ambiguities by throwing out nuances and meanings is not helpful in exploring reality.

2. CRITERIA RELATED TO SCIENCE

What can go wrong with respect to science? An awful lot, of which the least is to make factual mistakes. Some authors follow the hype. When ‘chaos theory’ entered popular culture through the book by James Gleick, a bookstore manager predicted me that it would be exploited theologically within a year. It only took a few months. Whereas thermodynamics and relativity theory were in fashion in the earlier decades of the twentieth century, newer fads have been quantum physics with its uncertainty relation, Gödel’s proofs about improvability, theories about chaos, self-organization and non-linear thermodynamics, and quantum cosmology. More general, there is not a single scientific idea which made it to popular science books which has not been abused.

The worst sin in science and religion can be expressed with a paraphrase of the first of the Ten Commandments:

I. You shall have no other sciences before me.

In my opinion we need to relate to science as it is, as the cumulative result of the work of many scientists, rather than invent our own science. Do It Yourself science, of which the replacement of $E=m.c^2$ by a pre-Christ $E = m.c$ is an example, is no help at all in that enterprise. It makes a caricature of ‘religion and science’. It is dishonest to one’s audience and to the work of many others.
If a spiritual thinker or theologian has a bright idea to change the science, that is in principle a contribution worth considering. But for a revision of science the proper audience is the scientific community. If my student could have made a good case for the formula $E = mc^2$, she should have made her case to specialists in relativity theory and other branches of physics, geology and cosmology, as these disciplines are involved. If they could be convinced that it was a serious option, then it could become an idea worth pursuing also in the religious community.

**MARGINAL SCIENCE**

There are scientists who are marginal in their own field, but who have attracted the interest of more speculative thinkers outside the scientific community. Halton Arp is an astronomer who objects to the Big Bang theory, David Bohm was a physicist with a following of his own, and Rupert Sheldrake’s ideas about morphogenetic fields have generated more interest among spiritually minded outsiders than among scientists.

In my opinion it can be a very valid intellectual exercise to argue about the ideas of an author whose ideas are marginal in the scientific community - to think through, for instance, the implications of the ideas of David Bohm for our conception of time and timelessness. However, in presenting such explorations one should be honest about the standing of these ideas within science.

**REVISABLE OR CONSOLIDATED?**

In principle, all scientific ideas are provisional and revisable. However, in my opinion the natural sciences are effectively a cumulative enterprise in which major segments of knowledge have become consolidated. The information embodied in the Periodic Table of Elements - starting with Hydrogen, Helium, Lithium and the rest - seems to me to be as secure as anything could be. It is integrated in the web of our knowledge and of our actions in many ways. It is the joint product of British scientists such as John Dalton, a former fellow of Manchester College the Frenchman Lavoisier and the Russian Mendeleev, and has since become accepted across the globe. Treating the Periodic Table as consolidated knowledge does not mean that we claim to know what ‘substance’ is. When we dig deeper we come to electrons and protons, and beyond that to quarks, and beyond that to superstrings; when we push on we get to speculative ideas rather than consolidated science.
As far as consolidated science goes, I see two ways of keeping ourselves sane. One is to pay attention to widely accepted textbooks, which do reflect the current view of the scientific community involved. Furthermore, if someone is working on spiritual issues in relation to a particular scientific discipline, it is important to have a scientist working in the field ‘looking over the shoulder’, not necessarily agreeing on the philosophical or spiritual views presented, but seeing to it that the scientific discipline is dealt with in a way recognizable to significant peers.

SELECTIVE USE - BUT WHAT ABOUT THE COHERENCE OF THE SCIENCES?

More respectful than inventing one’s own science but still very problematic is a selective use of science, of those theories that fit one’s own program, without paying fair attention to other parts which appear to be more challenging. For instance, the theologian Wolfhart Pannenberg discussed in his Anthropology in Theological Perspective (1985) life in relation to insights into non-linear thermodynamics followed by a cultural understanding of humanity, with no serious attention given to intermediate biological layers, whether sociobiology or the behavioural-genetic paradigm. The geneticist and theologian Lindon Eaves was offended and asked about Pannenberg’s anthropology: ‘Does it address scientific anthropology where it ‘hurts’ most or is it merely an eclectic aggregation of those anthropological ideas which are most convenient for theology?’ Selective, eclectic use of science may make the task of a theologian easier, but at the expense of credibility. A better alternative would be to engage science where it ‘hurts most’; to engage in reverse eclecticism.

The basis for my resistance against an eclectic use of science is the coherence of the sciences. Science does not consist merely of isolated theories of which some can be accepted, according to one’s own preferences. Disciplines have a certain integrity by themselves, but there are also many connections. An astronomer need not know much biology, but their disciplines do have to be consistent in the way they use physics. In the nineteenth century, physics and biology were at odds - biologists spoke of hundreds of millions if not billions of years of evolution whereas major physicists such as Lord Kelvin gave a mere twenty million years as the best estimate for the Age of the Solar System. With the discovery of nuclear fusion as a source of energy the coherence between biology and physics was restored. In the long run coherence between the various sciences has proved to be a very reliable guide.
This coherence of the sciences, even more than any particular statistical proof, makes scientists extremely sceptical of astrology and homeopathy as purported knowledge which is isolated from and at odds with well established science. Astrology does not fit within our understanding of the way forces at astronomical distances work. And homeopathy is at odds with the basics of chemistry. There may well be wisdom in folk medicine, but to accept the efficacy of dilutions which reduce concentrations to less than a single molecule per portion taken is not merely to add one small element to our knowledge, but also to throw out the basics of chemistry and physics.

One cannot choose only bits and pieces of scientific insights into our world. It is just as in a personal relationship such as marriage; one has to engage with the whole person - which may be more demanding than dealing only with the easy pieces but will be more rewarding in the long run. In this light, the seventh of the Ten Commandments is very appropriate:

VII. Neither shall you commit adultery.

For it is like adultery to walk away from the challenge of a deep relationship with the whole enterprise when one goes for more partial and superficial relationships.

3. PHILOSOPHY OF SCIENCE

Interest in philosophy of science and other discussions on 'rationality' is fairly strong in the science-and-religion discussion, perhaps especially among those who come from academic reflections on the philosophy of religion. The reflection on philosophies of science is a valuable contribution. However, I am sometimes concerned that one is caught in an unending set of 'prolegomena' on rationality and reason, a foreplay which never moves on to substantial discussions.

Aside of overdoing the 'philosophy of science' discussion, there also is a particular style to it that is sometimes problematic. In academic courses on 'science-and-religion' the philosophy of science text that is required reading most often is Thomas Kuhn, *The Structure of Scientific Revolutions.* This is a great book, but its popularity in the context of science-and-spirituality gives reason for concern. The book has become an icon for a social view of science. This alleged message of Kuhn's book has attracted authors on 'science and religion' who were keen to
draw analogies with religion, suggesting that since science is more subjective than previously thought, the social and subjective aspects of religion should be no reason for concern either. A similar use has been made of postmodernism, suggesting that the troubles for Christian theology in the context of modern ideas about reason are over; everything is equally particular; even science cannot aspire to deliver universal truth.\footnote{14}

My concern is that genuine reflections on the nature and history of science—such as Kuhn’s careful studies—are abused in a \textit{tu quoque} argument, suggesting that the loss of credibility of science would be a gain to theology. I consider this a mistake for various reasons.

Such arguments too often use, or rather interpret, the conclusions summarized in a few slogans without paying sufficient attention to the careful analysis that grandmasters in philosophy and history of science such as Thomas Kuhn have offered.\footnote{15} This is like summarizing evolutionary biology, quantum physics or the history of science-religion interactions in a few slogans. The polemics then centers on the grand scheme as summarized in this way, whereas the richness and the power of these research programs is in the details.

The relativistic and historicist approach gives, in my opinion, an unnecessarily problematic picture of the situation of science. Certain legends about science have rightly been exposed as illusions, but that does not mean that there cannot be a more nuanced view of science as a social enterprise which in a cumulative way extends our knowledge of the world. As Philip Kitcher says in his \textit{The Advancement of Science},\footnote{16} which in my opinion offers such a more nuanced view: ‘Flawed people, working in complex environments, moved by all kinds of interests, have collectively achieved a vision of parts of nature that is broadly progressive and that rests on arguments meeting standards that have been refined and improved over centuries. Legend does not require burial but metamorphosis’.

One may also wonder whether it really helps the credibility of religious and moral convictions to emphasize that science is socially conditioned. It may rather lead to a relativistic dismissal of religious traditions as culturally conditioned.

Downplaying the cognitive pretensions of science makes life for religious believers too easy. It suggests that one need not pay attention to the challenges due to scientific insights regarding reality and human nature. To say it once more with one of the Ten Commandments:
IX. Neither shall you bear false witness against your neighbour.

For a false witness of the credibility of scientific insights can be abused to keep substantial insights at bay.

I want to emphasize that there are also genuine insights coming from social and historical studies of science and from postmodernist reflections on culture. Such studies also generate challenges themselves, even more for religious beliefs than for scientific insights, as the latter have a better record of unifying knowledge and pragmatic success. Though I am sceptical of direct moves from philosophy of science to philosophy of religion, we in science-and-religion should at least acquire more modesty from studying the philosophy of science. It may be beyond our reach to say how reality really is. However, whether more inclined to realism or to instrumentalism or empiricism (or whatever label is used), those interested in genuine knowledge about our world share the question ‘How could reality possibly be the way our scientific theories say it is?’

4. HISTORICAL STUDIES OR ICONS

Engagement in historical studies clearly befits the fifth commandment, V. Honour your father and your mother, but do see them in their context.

Science and religion have not always been friendly towards each other. Andrew D. White spoke a century ago of a ‘warfare of science with theology in Christendom’. The Galileo-affair and the reception of Darwin’s ideas are two major icons of conflict. Some authors have suggested the opposite; these conflicts are of marginal importance. The rise of science in the seventeenth century should rather be seen as a consequence of religious convictions. Whether emphasizing conflict or coherence, history has been brought into the discussion not just out of interest in the history of the interactions, but rather as an ally in contemporary debates.

The study of the history of science and religion is valuable, in my opinion, but not so much as an ally for any particular position. Rather, it shows how complex the interactions have been, and how far from obvious may be distinctions which we do not bother to think about. As John H. Brooke wrote,

it is almost always assumed that there are lessons to be learned from history. The object of this study is not to deny that assumption but
to show that the lessons are far from simple. (...) The real lesson turns out to be the complexity.\textsuperscript{19}

Among the insights from contemporary historians is the observation that counter-examples to any stereotype can always be found. Streamlining the historical account of science in its relation to religion is a temptation which should be avoided.

Furthermore, historians have shown that our current distinctions between 'science' and 'religion' are not useful when seeking to understand authors such as Newton who did not live by such modern distinctions. History is one of shifting meanings of the terms 'science' and 'religion', and of the boundaries between what was considered science and what was considered religion. Taking science and religion as clearly defined entities involves the danger of neglecting the variety of activities covered by these terms and isolating both from their common cultural and social context. As the concepts 'science' and 'religion' are subject to change, the scholars Lindberg and Numbers\textsuperscript{20} conclude that

"we must not ask 'Who was the aggressor?' but 'How were Christianity and science affected by their encounter?'"

Not only do meanings change over time, but they are also diverse and used eclectically at any moment, since the style and strategy pursued by an individual often reflect the rhetorical situation in relation to the audience and the aims of the moment.

From the historians studying such interactions we can learn that positions of various contemporary authors may be understood better when attention is given to their understanding of religion and of science and to the audiences to which they are addressing themselves. This would be a contextual and non-religionist approach, which avoids simple conflict-interpretations as well as apologetic attempts to claim support from the history of science for traditional beliefs.

Though a thorough historical tour is fascinating, studies of particular historical cases cannot be transposed to our time since each episode is embedded in its own wider context. This is especially true of studies which focus on a few heroic individuals, for instance on the faith of a major scientist. We should explore the avenues that are open to us in an intellectually honest way, given the resources of our own time. Hence, we have to move on from historical studies to reflections on contemporary science. A 'flight to history' is inadequate.
5. RELIGIOUS STUDIES

Scholars involved in reflection on science and theology often treat these enterprises as attempts at understanding our world - and thus behave as if science and religion are partners in a common cognitive enterprise. However, religious practices and beliefs are phenomena in the world, and thus also objects of scientific study. The study of human religions is primarily the business of anthropologists, sociologists, linguists and historians though there have been ventures from sociobiology into the study of religion as well.

In their studies, religions are, to a large extent, understood as functional phenomena in social contexts. Rituals allocate to individuals various roles and enhance the sense of community. Such a functional understanding of religions makes me hesitate about studies of science and religion which focus exclusively on ideas, as if the ideas can be abstracted from the way they functioned or will function. There is a legitimate place for metaphysical speculation, e.g. about the nature of time and the ground of existence (see yesterday’s lecture), but such metaphysical reflections only become religiously relevant when integrated into a web of beliefs and practices which shapes human lives. Thus, in the study of religions we should keep the following commandment:

IV. Observe the sabbath day, and other religious practices, for they are as essential as the more metaphysical aspects of religions.21

VARIOUS ASPECTS

Three views of religious utterances can be distinguished. They can be seen as cognitive propositions (‘God exists’), as expressions of certain emotions and attitudes (‘He is my brother’) and as stories and rituals shaping a culture. Thus, aside of the cognitive dimension there are moral and aesthetic aspects of religions.22 Science-and-religion tends to concentrate on the first understanding of religious speech, as claims about reality. However, if the aspiration is to cover the whole interaction of science and religion, those other aspects of religion have to be taken into account as well. Science is not irrelevant to those aspects. For example, evolutionary biology and neurosciences can enrich and challenge views of human emotions and human cultures.

Reflection on the diversity of aspects of religion is not merely relevant for understanding organized religion; it is also needed for understanding ‘spirituality’
in our culture. Sometimes spirituality is associated with a particular set of metaphysical beliefs, say about the presence of a spiritual dimension or being independent from material reality, whereas spirituality may also be understood as referring to a certain way of life. The self-understanding of Christianity in mainstream protestant thought in Europe seems to be swinging back from a life-oriented approach which was more prominent in exegesis and systematic theology in the period after the Second World War to emphasis on tradition, on angels and other forms of super-naturalism which becomes indistinguishable from magical thinking. However, it is the existential rather than the magical type of theological thinking which is more open to a non-religionist, anthropological understanding of religion.

THE EFFECTS OF KNOWLEDGE OF ONE’S ORIGINS

In my opinion, the ambition should be to hold beliefs which are able to coexist with knowledge of their origins, function and material embodiment. If I believe that melting snow becomes water, and then someone comes along and explains to me that I have that particular belief today because of certain chemicals in my brain which reacted in a peculiar way to the orange juice I had at breakfast, I would have no reason to stay with my original belief. It would not be disproved in a formal sense - as it is, the belief is true; melting snow does become water - , but in this case knowledge of the origins indicates that I have no good reason to hold that belief.

However, if someone comes along and explains to me that I have this belief because I had experiences with melting snow, experiences which have influenced my brain state in such a way as to form this belief, then there is no reason at all to consider the knowledge of the origins of the belief to be inimical to the belief. Rather the reverse. Beliefs can coexist well with knowledge of their origins, and such beliefs can be held in an intellectually honest way.

The issue is how to think about religious truth claims if we acknowledge that religions emerged as functional traditions. For comparison, let us start with the example of beliefs about trees. On an evolutionary view, the adequacy of our language about trees, with notions such as bark, leaves and fire wood, is intelligible since this language has been modified in a long history of interactions of humans with trees and with each other in conversations about trees. If one came across a culture with no past experiences with trees, it would be a very surprising coincidence if they had an adequate vocabulary for trees. We refer to trees in fairly adequate ways because our language has arisen and been tested in a world with particular
ostensible trees. Now back to religions and reference. There seems to be no locus for particular divine activities in a similar ostensible way. This makes it unlikely that particular ideas about gods would conform to their reality. A functional, anthropological view challenges religions by undermining the credibility of their references to a reality which would transcend the environments in which the religions arose.

One might propose a different analogy, not between religion and sense perception (seeing trees) but between religious claims and claims in mathematics or ethics. For instance, the philosopher Philip Kitcher wrote, in the midst of a discussion on sociobiology and ethics: 'Even if [E.O.] Wilson's scenario were correct, the devout could reasonably reply that, like our arithmetical ideas and practices, our religious claims have become more accurate as we have learned more about the world'. However, there are relevant differences between the status of mathematics and ethics, and the status of religious ideas. Mathematics may be seen as a second-order activity, growing out of the analysis of human practices such as counting and trading. Similarly, ethical considerations involve a second-order reflection upon procedures or standards which may be fruitful in resolving conflicts of interests with reference to an (unavailable) impartial perspective. As second-order activities, they aim at norms of universal validity, but these 'transcendent' claims may be construed without reference to a realm of abstract objects apart from the natural realm with all its particulars. Moral intuitions and judgements may be considered first-order phenomena which do not need a 'supernatural' realm for their explanation nor for their justification.

In contrast, religions are first-order phenomena in which there is, in most cases, some form of reference to transcendent realities, denizens of another realm. Whereas such references in morality and mathematics may be reconstructed in terms of procedures for justification, religions are much more tied to an ontological view of those realities: gods are either supernatural realities or they are unreal, non-existent. In this sense, an account of the evolutionary origins and adaptive functions of religion is a much stronger challenge to the truth of religious doctrines than is a similar understanding of the origin and function of arithmetic or morality, since mathematical and moral claims are not so much seen here as truth claims about reality, say about causally efficacious entities, whereas religious claims are often taken to be of such a kind.
Whereas an account of ethics which avoids reference to a non-natural realm need not affect morality, a similar account in theology may have more radical consequences, as it would undermine the referential character of statements which purport to be about a non-natural God.

Well, I have slipped from the discussion of criteria into a substantial discussion. Let me get back to the criteria.

An a-historical discussion of particular religious views, say on divine action or on time and eternity, may be an interesting exercise in the shared domain of religion and metaphysics. However, a more complete account of religion and science also needs to take into account the social dimensions of religion, and with those dimensions the social context in which religious ideas have their origins and functions. We cannot assume a culture-free culture, and generalize as if our Western intellectual and social arrangement is global and timeless, with everywhere the same concerns and questions. And even though science, mathematics and ethics too have their social history, the way this affects their credibility may well be different as these various human practices are developed by humans in different ways. Thus, it is not sufficient to claim credibility for the cognitive and metaphysical claims of the religious enterprise by analogy with the cognitive credibility of the scientific enterprise. Rather, the case has to be made separately for each enterprise, such as science, ethics and religion. This was already explicit in the tenth commandment, which can be rephrased as follows:

X. Neither shall you claim your neighbour's credibility, and that of his laboratories, his fieldwork, his calculations, his instruments, and anything that is your neighbour's

6. THEOLOGICAL ISSUES

Within the Western christian tradition, liberally understood, there are a few theological issues where science-and-religion discussions run the risk of being unsatisfactory in my opinion.

KNOWING THE UNKNOWABLE

One has to do with knowledge and language. While God is thought of as transcendent, also as being beyond our knowledge, sometimes arguments are
pursued without hesitation - as if we have knowledge of the unknowable. We should be alert where and when to stop our arguments.

There is also the risk that we use our language as if it were fully transparent. The need for interpretation, the challenge of hermeneutics when appropriating texts which date from a few thousand years ago, is not always taken into account. Not only the temporal distance between us and the text, but also the mythical character of many religious texts should give us reason to tread carefully rather than rush in.

MORE THAN ‘CREATION’

The subject can also be chosen too narrowly, as if science-and-religion is only about ‘creation’, with disputes on evolution and design. More careful consideration shows that every aspect of theology is at stake. How do we think about God when there is no heaven ‘up there’? How to think of divine action in the light of the lawfulness of natural processes? How to think about death in the light of evolution? How about sin if altruism and deception developed out of enlightened self-interest? What about the significance of Jesus of Nazareth in a universe which may well have planets with other sentient beings. What about eschatology?

DISSONANCE

There is one theological issue which troubles me the most. The ambition of many in science-and-theology is to show some form of coherence or consonance between scientific and theological ideas, to discern how our world fits into a cosmic order. Sometimes this takes the form of natural theology, arguments from natural reality to the plausibility of a Divine design. Sometimes this takes the form of a theology of nature, an attempt to think clearly about natural reality in the context of religious convictions. Whatever the conception of theology, as long as the aim is to show harmony between religious and scientific insights the emphasis seems to me one-sided if not misguided. As Gerd Theissen, a scholar of the New Testament, wrote:27

Every faith contradicts reality in some way. That is inevitable, if faith is an unconditional ‘Yes’ to life. Think of all the horrors that could contradict this ‘Yes’! Think of all the oppressive experiences against which it has to be affirmed: all the probabilities and certainties, including the certainty of one’s own death!
Seen in this light, religion is not a reflection of positive experiences, but rather a protest against experiences of injustice or human disorder. Science and religion have a different relation to reality; the one describes and explains, whereas the other looks primarily for transformation towards justice and perfection. This is a modern version of the problem that led Marcion to the first major heresy in the history of Christianity. Marcion did not see how the Creator of this ambivalent world could be the loving Father of Jesus Christ. He came to believe that they were two different gods. This challenge is still with us in contrasts such as between facts and values, between reality as it is and as it should be. In my reconstruction, of which I spoke yesterday, it surfaces also via the two roles that religious beliefs have, namely as limit questions triggering a sense of mystery and transcendence, and as religious traditions embodying wisdom for living; whereas the latter can articulate a sense of contrast between what is and what should be, the first approach does not accommodate the prophetic dimension easily.

The issue is not the origin and explanation of evil and tragic aspects of life, but its acceptance. Mixed feelings about the world have emerged quite explicitly in the modern period. The French philosopher Voltaire gave his *Poème sur le désastre de Lisbonne* (1756) the subtitle "Or an examination of the axiom ‘All is well’." Another illustration can be taken from Dostoyevski’s *The Brothers Karamazov*. One of the brothers, Ivan, wants to return to God his ticket of entry into the world. The suffering in this world is not justified by heavenly meaning. ‘And if the sufferings of children go to swell the sum of sufferings which was necessary to pay for truth, then I protest that the truth is not worth such a price.’ Even an heaven up there does not really solve the problem. It is especially this - broadly indicated - issue of the tragic and evil aspects of reality that makes me hesitant about too close an integration of scientific and theological ideas.

In my opinion - now coming back to criteria for quality - any theological proposal which speaks only of consonance is fundamentally incomplete. It may accommodate a mystical sense of faith but not the prophetic one. Any interesting theological reflection should pay attention to dissonance, to evil and the tragic aspects of life. It cannot be only a quest for ultimate understanding, completed when we would know ‘the mind of God’, but should also be also a quest for change if not redemption.
This desire creates a great difficulty in assessing quality. Intellectually one might equate quality with seeking as much harmony with the scientific description of our world as possible, whereas morally and spiritually, I believe there ought to be a clear sense of disharmony. In the discussion on quality we encounter the problem of evil, or rather Marcion's heresy, the most profound heresy in Christian history. The temptation is to separate the emphasis on order (creation) from that on disorder (and the need for transformation).

Of the Ten Commandments this is captured well in the third one, about not using the name of God in vain, for it seems to me to be in vain if God is invoked only as an ultimate explanation, without capturing the moral perspective and the tension between those two ways of thinking about God.

III. You shall not take the name of the Lord God in vain, since the tragic aspects of reality preclude any easy consonance of science and faith.

7. SPIRITUALITY

The issue is not only how we think about God, but also how we see ourselves and our responsibilities, how we live with our failures and accept life's darker sides. That is what I see as spirituality. I want to emphasize a few aspects in particular.

We have discovered much about reality, but we are not transparent to ourselves. Even the most rational individual has his (or her) odd habits and beliefs. Every human can be surprised about his (or her) own behaviour. This is very important to the future of religious traditions in our age, for it implies that we cannot manage ourselves rationally or raise our children only with rational insight. We are hopelessly addicted to stories and examples, to symbols and rituals - to forms of life which might be considered religious, even when not labelled thus.

We feel guilty, and sometimes deservedly so. But, at least in the Netherlands in the sphere of alternative medicine, this sense of guilt is also abused spiritually. Thus, some healers tell their clients that they should think positively, and then they will heal. The message suggests that their disease is due to a lack of positive thinking - as if one's cancer is a mental and moral failure rather than bad luck. Spirituality should not be a denial of the hard sides of life. Let me refer back to the discussion on dissonance above; we cannot speak only of cosmic order, but have to live with disorder as well.
8. APPROACHES

Let me end with some remarks on possible approaches of science and religion.

One thing is that reflecting on ‘science and religion’ should be more than offering a popularization of science with a pious gloss at the end, as if the calculations deliver a world view. An exposition on scientific issues followed by a sudden jump to metaphysical or religious discourse runs the risk of delivering not much more than one’s religious prejudices. There is need to reflect also upon the nature of the scientific insights and even more upon one’s religious convictions.

One of the issues that needs to be considered is the use of science. Whether to concentrate on consolidated knowledge or on less secure parts depends on what one wants to use the science for. If one builds bridges, the insecurity about the nature of substance (deep down, as superstrings or whatever) and about the nature of space and time (in quantum gravity) is irrelevant. Chemistry offers enough insight and a classical understanding of space and time is adequate. If one’s theological interest is primarily anthropological and existential, evolutionary biology and psychology may be sufficient, whereas arguments about metaphysical issues such as the fundamental nature of time and space or the locus of divine action in our natural order cannot but face the speculative, insecure parts of science. Science has many faces, even though they are faces of the single quest for coherent knowledge.

What I find unsatisfactory as well, is the flight to descriptive and analytical projects, focusing only on epistemology, history or exegesis. It is useful to study epistemological and historical complexities, but beyond that lies a constructive task to articulate what one might believe about the nature of reality and what place can be given to which moral and spiritual values.

Well, that is enough for the negative side. How should we proceed? Let me offer my reflections on the renewal of religious images.

In my opinion the development of physics offers an helpful analogy. When we consider major transitions, such as the one from a Newtonian conception of space and time to an Einsteinian one, or from classical to quantum conceptions of matter, we may be struck by the lack of continuity at the level of ontology. Concepts used are very different. However, there is continuity at less abstract levels of knowing,
for instance with respect to predictions for the orbits of planets. Thus, concepts of the old and the new theory do not need to match, but the new theory should aspire to do (better) justice to the experiences and experiments which to a large extent were also coded in the old theories.

Similarly in religion. We need not aim at continuity at an abstract level, which is one or more interpretative steps away from actual life. Continuity with the insights of earlier humans, including those found in the Bible and the writings of the early churches, should be sought at the level of life as lived. The more abstract levels, including notions such as the trinity, the virgin birth, heaven, and even God, are to a large extent constructions, and these constructions or interpretations may change drastically even when one seeks to be fair to the underlying experiences.

Fundamentalists and those who reject Christianity because they think it has to be fundamentalist, often make the error of conflating different levels. They take the original form of expression of human concerns and experiences to be as important as those experiences and concerns themselves. One may attempt to develop new world views in which everything old has an equivalent, while ending up with a complete failure since the new images do not relate sufficiently to the experiences that led to their predecessors. For instance, one might update eschatological images of 'another place', 'a future perfection', and 'personal life beyond death' in such a way that major underlying concerns, such as anger about injustice, are lost out of sight.

Thus, in my view, the best way to renew religious language and models is to think about the images as they functioned for humans in earlier periods, and to find out as far as possible what the underlying concerns and experiences were. Insofar as we recognize those experiences and concerns and see them as our own, we can attempt to develop new images and models, new ways of dealing with them in images which are credible in our time, in the context of all else that we take serious, including science.

This is unlike realism in the sense that it does not seek to protect (by reinterpretation or otherwise) the truth-claims of religious metaphors and models of an earlier age - because these metaphors and models are not so much understood as truth-claims but as language which was functional since it helped the individual in living his or her life and the community by creating and maintaining a culture.
Rather than concentrate on the truth claims which appear to be articulated in metaphors and models, I think that we should pay attention to the relevance these images had in the context they lived in. Hermeneutical approaches give much more weight to the context of religious beliefs, the way they functioned. If a hermeneutical approach is used to keep scientific insights at a distance, the resulting view will not be credible or helpful in communicating ideas in our time, but an open minded hermeneutical attitude is, in my opinion, essential to a sensible constructive project.

THE EPILOGUE: THE MERCIFUL HEALER

Let me conclude with a brief epilogue on the merciful editor. From the aspiring author’s perspective, editors and others who reject papers may be seen as robbers, slaying one’s convictions and then letting one bleed to death by the roadside. However, there still is one of the Ten Commandments which I have not mentioned yet, though it is very well known:

VI. You shall not kill persons but ideas.

That applies to editors and teachers as well. We have to accept those with whom we differ. Luckily enough, we can shoot down ideas without shooting down persons; we can discuss critically ideas while respecting the person. The merciful editor might do more than shoot down ideas. He or she could also take time to care for a paper and a person, and to see whether the engagement that lies behind the paper can find more fruitful articulation. Even if a student or colleague is not articulating a position with which I sympathize, I still may engage in critical reflection and attempt to see the other’s position from that perspective, seeing whether I can improve the presentation and defense of the ideas involved.

The area of ‘science and spirituality’ is a rich one. In our cultural context it is not irrelevant what views we will defend nor how we defend them. Quality is important.

SUMMARY

I. You shall have no other sciences before me.

II. You shall not bow to a graven or written image as if it has caught univocally in its construction and argumentation everything that is in heaven above,
or that is on earth beneath, or that is in the water under the earth.

III. You shall not take the name of the Lord God in vain, since the tragic aspects of reality preclude any easy consonance of science and faith.

IV. Observe the sabbath day, and other religious practices, for they are as essential as the more metaphysical aspects of religions.

V. Honour your father and your mother, but do see them in their context.

VI. You shall not kill persons but ideas.

VII. Neither shall you commit adultery.

VIII. Neither shall you steal.

IX. Neither shall you bear false witness against your neighbour.

X. Neither shall you claim your neighbour’s credibility, and that of his laboratories, his fieldwork, his calculations, his instruments, and anything that is your neighbour’s.

NOTES

1. Matthew 22: 39 (Mark 12: 31; Luke 10: 27), Matthew 7: 2; the parallel text in Luke begins ‘Judge not, and you will not be judged’ - a quote which is less useful in the current context.


4. This is argued clearly and cogently by Earman, A Primer on Determinism, 4.

5. P. Kitcher, Abusing Science: The Case Against Creationism (Cambridge, Mass.: MIT Press, 1982), 181ff., discusses various examples from creationist literature where they quote in a partial way, apparently deliberately distorting the text in a way that suits them; ‘for the Creationists, misleading quotation has become a way of life’ (181).

6. This point is very well made by K.V. Wilkes in the first chapter of her Real
People: Personal Identity without Thought Experiments (Oxford: Clarendon Press, 1988). As an example in our context, the many stories by John Leslie supporting his anthropic arguments deserve very careful reading. This has been done well for Leslie’s ‘Doomsday argument’ by Dennis Dieks, Doomsday - or: the dangers of statistics, The Philosophical Quarterly 42 (166, January 1992): 78-84, a paper which Leslie has curiously omitted from the bibliography of his The End of the World: The Science and Ethics of Human Extinction (London: Routledge, 1996).


8. As Mackie (op cit., 179) quotes from Richard Whately, Elements of Logic, p. 151.

9. See for instance the discussion on creationist fears about evolution in the final chapter of P. Kitcher, Abusing Science.


11. As I argued at greater length in my Beyond the Big Bang: Quantum Cosmologies and God (La Salle: Open Court, 1990), 186f, and in my Religion, Science and Naturalism (Cambridge: Cambridge University Press, 1996), 125f.

SPIRITUALITY OR SUPERSTITION: CRITERIA FOR QUALITY IN SCIENCE, RELIGION AND POPULAR CULTURE


13. According to statistics compiled by CTNS (Berkeley) in January 1997 on the basis of courses that won a prize in the Templeton program.

14. 'Postmodernism' seems to be more popular among American authors on science and religion than in Europe. Three major science-theology authors have given last year in different ways a positive assessment of postmodernism: N. Murphy, Anglo-American Postmodernity (Boulder: Westview Press, 1997), J.W. Van Huyssteen, Essays in Postfoundationalist Theology (Grand Rapids: Eerdmans, 1997) and, most guarded, P. Clayton, God and Contemporary Science (Edinburgh: Edinburgh University Press, 1997).


17. Drees, Religion, Science and Naturalism (Cambridge University Press, 1996), 139-144. In my opinion, the arguments for 'critical realism' in theology as advanced by Ian Barbour and Arthur Peacocke assume more similarity to arguments about critical realism in science than warranted.