Blessed Peter the Apostle, who received a promise from the Lord that on his confession of faith the Church would be founded – against which the gates of Hell are not able to prevail – in order that, against Hellish gates of this sort, the faith of the Church entrusted to him would persist in purity, he addresses the faithful of Christ (fideles Christi), saying: “Keep holy in your hearts Christ the Lord” [1 Pet 3:15] – that is, by firmness of faith.

With this foundation of faith established in our hearts, we will be able to be safe against all of the unbelievers’ assaults or mockeries.

Whence Peter even adds: “Always be ready with a defense, for anyone who is asking you the reason concerning that which in you is your hope” – and your faith.

EDITORIAL POLICY
Submissions are peer-reviewed by two referees. Please email for our evaluation your publishable monograph in Word format to fideles@rpcollege.bc.ca

Correspondence may also be mailed to:
Dr. Christopher S. Morrissey
Redeemer Pacific College
Trinity Western University
PO Box 1409
Blaine, WA
98231-1409

EDITORS: Christopher S. Morrissey, Ph.D., Robert Stackpole, S.T.D.

COVER DESIGN, and LAYOUT for Vol. 2 (2007) by J. J. Hutcheson

Laws of Nature and God’s Word for Creation

Arnold E. Sikkema

It is important to develop a Christian perspective or worldview on how the world “works” and about how God relates to the creation. Without such grounding, we join in some of the fallacies plaguing today’s culture, such as philosophical materialism, naturalism, and the dualisms between science and religion and between the natural and the supernatural. In this article, I will discuss what we — both scientists and members of the general public — mean when we speak about natural scientific laws, or laws of nature, as well as what the Bible says about God’s ordinances for creation, particularly in terms of his showing covenant faithfulness toward his creation. Along the way, we will consider examples of natural scientific laws, and the ways they are used. Habits of mind and ways of thinking relating to science generally will be explored by considering what we have historically understood by natural laws, not only in the grand sweep of the history of science but also in the development, training, and work of individual scientists.

Examples of Natural Scientific Laws

To help set the context, let me simply list a number of natural scientific laws. Note that by “natural science” I mean our study of those aspects of created reality which don't involve human activity. That is, we’re not thinking here about sociology, politics, etc., even though these certainly are within the created order, and their norms and governing principles could be thought of as laws of the created order. Thus we are considering laws of mathematics, physics, chemistry, and biology only; once we think about psychology, we have moved beyond the scope of this article.

Arnold E. Sikkema is an Associate Professor of Physics at Trinity Western University.
In mathematics, we have arithmetic laws which relate to the addition of numbers, rules of Euclidean geometry which concern angles in a triangle and other structural features of geometric objects, and methods in calculus regarding the mathematical techniques of finding limits as well as differentiating and integrating functions. In physics, we have Newton’s laws of motion regarding interaction and acceleration, laws of thermodynamics and statistical mechanics connecting the behaviour of atoms and molecules with macroscopic properties like the temperature and pressure of fluids, and laws of quantum mechanics, such as Heisenberg’s uncertainty principle and the Schrödinger wave equation concerning the discrete and probabilistic description of the sub-atomic world. In chemistry, we have stoichiometric laws regarding the ratios by which elements combine in molecules and their reactions and laws of chemical equilibrium regarding forward and backward reaction rates. In biology, we have often less quantifiable laws such as the “law” denying spontaneous generation as well as genetic laws regarding the passing on of traits through reproduction.

Being a physicist, I will speak mostly about physical laws, but it seems to me that the main characteristics of these other natural scientific laws are similar in most, though certainly not all, respects.

Ways of Using Natural Scientific Laws

Scientists use natural scientific laws for at least four main purposes. First, we classify creatures and phenomena into different categories according to the laws relevant to them. For example, we identify and distinguish plants and animals, as well as solids, liquids, and gases. We identify and distinguish phase transitions according to their types (e.g. solid to liquid, normal metal to superconductor, first-order) and chemical reactions (anaerobic, exothermic, catalytic). Second, laws are used in the explanation of natural structures and processes, which is arguably the main goal of science. Third, natural scientific laws are used to predict what would reliably happen in circumstances which naturally or artificially arise. And fourth, in technology, that is, in the development of cultural artefacts for specific ends (such as exploration, food preparation, entertainment, warfare, environmental control), much dependence upon the specificity and reliability of natural scientific laws is required to open up the features and potentials of the elements and phenomena of the created order in order to produce things which are helpful for our fellow humans and for the rest of creation as well. Science can, especially through technology, be used for good or for ill.

There is a mutual interaction between each of these functions of the laws of nature and our worldview: they each affect, and are affected by, our worldview! All of the ways we use and think about the laws of nature, both in everyday life and in
the laboratory, lead us in various ways in how we think about the world, how we see the world and how we understand what the basic principles of the world are.

Habits of Mind

A roughly sequential set of habits of mind developed historically with the advance of the natural sciences over the past few centuries. It appears that these habits undergo a kind of recapitulation in the life of a typical scientist as well, through training and experience. And our culture at large is significantly affected by certain elements of these habits of mind, and in some cases our Christian worldview is compromised by them. So I would like to first describe, and later prescribe, these habits of mind.

First, the laws of nature are discoverable. By our effort in experimentation, we expect to be able to determine relationships between things, and to understand the reasons for things. It is, in fact, an element of God’s goodness that the laws are discoverable, for it certainly could have been the case in a “possible universe” that there might be regular patterns connecting phenomena but that these would remain thoroughly invisible to us. It is our conviction that the creatures and phenomena we experience ought not remain enigmatic and unrelated, and so we press on, flushed with success, to pursue overarching descriptions and explanations.

Second, the laws of nature ought to be simple. Perhaps this comes as a surprise to the reader who has struggled through one or more physics classes and recalls futile attempts to commit all those horrendous formulae to memory. But in fact, if we have two different candidate laws which both seem to describe the same phenomenon equally well, the one we typically consider right is the simpler of the two. This principle of parsimony, or Occam’s razor, is thus used as an important tool in the judgment of scientific theories. Even if she knew nothing about the theory of special relativity, a biologist would agree that Einstein’s $E = mc^2$ is more likely to be true than $E = km^3$.

Third, laws are verifiable. In addition to being based upon observations, we expect that one should be able to test whether the law is, in fact, applicable. Do the patterns and regularities of the world agree with those which are claimed by the scientific law? It should be noted, however, that there always remains an element of tentativeness about the laws.

Fourth, the laws of natural science are reliable, both from day to day and from place to place. We expect that the relationships characterized by natural laws one day will remain true to form the next day as well.

Fifth, laws of nature are causal. We suppose that the laws of nature determine the result of an experiment, or the next event we observe, as a consequence of
the starting conditions. The entities and their relationships at the beginning will produce a certain effect, which depends on the initial and boundary conditions in a causal way. For a given input, we expect that the resulting output flows from this input according to a law-prescribed pattern. Our belief, understanding, or expectation — that is, the habit of mind we develop — is that this is because the laws of nature have made the initial conditions result in the final conditions.

The remaining habits of mind in this sequence of their cultural and individual development have perhaps the strongest influence on worldviews.

Sixth, laws are largely seen as prescriptive. The laws of nature prescribe what happens next. That is, the laws do not only help us describe the way the world is — in its entities and phenomena — but they in fact make the world be the way that it is. In that sense the laws are seen as mechanical. There is a natural inexorable outworking of input leading to output by means of “turning a crank” or doing a calculation. The world is a machine. There is some ongoing mechanism which underlies the processes of the world.

Finally, the laws of nature are ultimate in some sense. There is nothing else but the laws of nature and they determine every single thing about the world. An ultimate goal of some areas of physics is to develop the “theory of everything” whereby it is hoped and expected that not only will all laws of physics be explained including the masses and interaction strengths of all “fundamental” particles, but everything in the universe will, at least in principle if not in actual practice, be explained purely via natural scientific laws: answers to questions such as why you are wearing a pink-and-green striped shirt, or why you are taking a sip of coffee right now.

While this last way of thinking about natural scientific law is highly speculative and does not enjoy broad support, the previous one has garnered wide popularity. Among Christians and non-Christians alike, many in our culture conceive of the world as the inevitable progression of events which are due to the way the world works. If one believes in a Creator, this view of the universe as a machine leaves one holding a deistic perspective, and not a theistic one; that is, God has only been involved in the origination of the world and has no relevant role in its ongoing existence. There are two main reasons for rejecting the mechanical world picture. First and most importantly for the Christian believer, it is incompatible with the Scriptural presentation of how God relates to his creation. Secondly, strict adherence to the universe as machine is held by most physicists to be incompatible with the conclusions of twentieth-century physics, because quantum physics and perhaps chaos theory show us that the world is not mechanical; there is openness (or indeterminism) in the course of events of the world. Since this latter reason has been the subject
of many publications, including a previous one of my own, this paper explores the former in more detail, after first considering a specific example which demonstrates how some of the above habits of mind are historically rooted.

**Why Things Fall: A Case Study**

Some laws start out clearly descriptive (phenomenological), but become considered prescriptive when it’s believed they’ve reached the level of complete explanation. But when a deeper law is found, the formerly prescriptive law is relegated to descriptive status.

From infancy to PhD and beyond, I have undergone, and continue to impart to my children and students, a regimen of training in the sequential episodes of our understanding of the physical aspect of the created world. Consider, for example, the case of a falling object. Why does an ordinary ball fall to the ground when dropped?

Let us consider, in broad sweep, the history of the theory of gravity, covering its three main phases: Aristotelian physics, the early scientific theories of Galileo and Newton, and the modern theory of gravity starting with Einstein.

Aristotle said that the world has a natural sequence of elements. Heavy and solid things are at the centre of the universe (“earth”), followed by liquids (“water”), gases (“air”), and “fire”: these four are the terrestrial elements common to our experience. Beyond that, in the heavens, we have a completely different type of substance, “quintessence”, of which the sun, moon, and stars are composed. So a ball falls because it seeks its natural place.

Two thousand years later, Galileo started to give some mathematical description to the way in which objects fall, particularly by doing measurements on a ball rolling down a ramp which he realized slows down the effect of gravity allowing motion to be measured more readily with the very limited timing methods of his day. He noticed that the distance through which a ball rolls during subsequent time intervals increases uniformly. Thus he was able to attain some mathematical understanding of the effect of gravity: gravity causes things to fall through increasing distances. This is not an explanation of gravity, but an exploration of its properties and consequences.

By considering the fact that speed increases by the same amount between successive time intervals, this indicates that the acceleration is constant. So we have the idea that a falling body exhibits constant acceleration, which is a good encapsulating description of the effect of gravity.

A few generations on, Newton advanced the notion of a force of gravity being responsible for the constant acceleration of a freely falling body. The earth exerts a force on the apple, which accelerates it downward. So, first we have the
simple idea of something falling. Then, quantifying the fall, we explain the increasing intervals as being due to a constant acceleration. And this constant acceleration is due to a constant force of gravity.

Newton's significant departure from Aristotelian physics was to suggest, and support mathematically, that the moon's motion about the earth is due to this very same force. The earth exerts a gravitational force upon everything in its vicinity, including specifically the moon. Thus Newton broke with the belief that heavenly bodies are essentially different from terrestrial ones. This gave a very good explanation of why the moon goes around the earth: it is being held in orbit by the force of gravity, the same force which causes an apple to fall to the earth.

So the force of gravity is due to the earth's pull on objects, and Newton's generalization to explain why the earth pulls on objects was to suggest that every pair of bodies, wherever they are located in the universe, attract one another.

In summary, Newton's explanation of the fall of an apple to the earth proceeds as follows. Any two bodies attract one another gravitationally; in particular, the earth attracts the apple. Gravity is a force, and an object experiencing a constant (net) force undergoes a constant acceleration. This constant acceleration causes falling speed to increase uniformly, and this uniform increase in speed results in the object falling through greater and greater distances in subsequent time intervals. (Later, more sophisticated approaches—such as the "principle of least action"—were developed to account for the kinematics of falling bodies, but these are equivalent in consequence to Newton's laws.)

Notice that we now have a theory of gravity which is based on the recognition that any two bodies must attract one another gravitationally. But we can continue to ask the question, "Why?" That is, even though we have in Newton's theory a good explanation of certain aspects of gravity, this explanation itself begs for an explanation. Why should any two bodies attract one another? For this, we turn to Einstein's theory of general relativity of almost one hundred years ago, which was the next advance in our understanding of gravity. This theory says that two masses attract one another because any mass distorts the four-dimensional space-time in its vicinity, somewhat like placing a bowling ball on a trampoline gives the elastic surface a funnel shape. Like a smaller ball rolling on this curved surface, a freely falling object actually traverses a direct path through this warped space-time, giving the appearance to a bystander that its trajectory is curved (i.e. the object is accelerating).

In each case, what is once a theoretical explanation gets "demoted" to the status of a special-case descriptive consequence, as more phenomena are unified and subsumed within a deeper explanation.
The most significant development in physics in the twentieth century is that of quantum physics. In quantum field theory, action-at-a-distance is understood as being due to the exchange of particles, called mediating bosons, of a pervasive field. The forces involved in electricity and magnetism are in this way exceptionally well-understood, as charged particles (like electrons) communicate their presence to one another via photons (the particles of the electromagnetic field), but understanding gravity as a graviton-mediated interaction within the larger umbrella of quantum field theory remains an elusive target. This unified theory would allow gravity to be seen as a counterpart to the other forces, each of which is a unique broken-symmetry consequence of a single grand unified interaction. That is, the one force manifests itself in different ways in different contexts, and electromagnetism, gravity, and the weak and strong nuclear forces are its various faces. Attempting to go beyond this, the speculative and increasingly controversial string theory seeks to explain the various particle types as different resonant modes of a more fundamental but higher-dimensional “string”.

This brief case study of the history of the theory of gravity illustrates and explains some of the various habits of mind that developed as science progressed: explanations are possible, theories are simple and generally applicable, and laws of nature (and nature itself) are seen as mechanical.

**Two Types of Laws**

When we talk about laws of science, it is important to realize that there are two different types of laws. One is the set of laws which we formulate as scientists to describe and explain the regularities and patterns we discover in the world, and the other type of law is the way in which God truly and deeply interacts with and provides for his creation. The first, as we specialize to the case of physics, I will call “laws of physics” and the second I will call God’s word for the physical aspect of creation.

**Laws of Physics**

We see that the laws of physics have certain characteristics, some of which we have explored above, and which are now explored in a bit more detail and comprehensiveness. They are often mathematically expressed in equation form; in fact, it has often been noted how suited mathematics is for the task.

The laws of physics are descriptive. That is, the law of universal gravitation does not actually produce a gravitational attraction between all pairs of masses in the universe; it merely describes what we see happening in the world, and encapsulates what we have discovered and what we believe to be the case about the world.
The laws of physics are human-formulated. We humans, finite as we are, write down the laws of physics, and express them in ways which depend upon the historical and cultural contingencies leading up to their formulation. The laws of physics are not handed down to us on a silver platter, or even revealed in any direct way.  

Following immediately from this human origin of the laws of physics, these laws are subject to revision. We have seen this clearly in the case of the historical progression in the law of physics which describes and explains gravity. The laws of physics are always provisional and tentative, but not dismissively so. Instead, as Polanyi says, the scientist must believe many theories, knowing that some are quite likely wrong — but we don't know which. In fact, strong commitment to theories is what allows for the possibility of progress, as described by Kuhn in his idea of scientific paradigms. So, for example, a Newtonian physicist must tenaciously hold to Newton's second law which states that $F = ma$, that is, the net force on some object must equal its mass multiplied by its acceleration, and must work with that relationship, exploring its consequences in various contexts. Eventually, it did in fact require revision; for example, in Einstein's theory, the concept of mass underwent significant alteration, as did our understanding of space and time.

The laws of physics are increasingly verisimilitudinous; that is, they more and more bear a resemblance to the way things truly are in the universe. In addition to a recognition of progress, this is a critical realist position, which claims that the things referred to in our theories actually do exist, while acknowledging that our theories do so only provisionally. From a Christian point of view, we can be quite confident that the world actually exists, having been created by God. While we do construct theories, we do not construct all of reality; it is ontologically prior to our theorizing.

The laws of physics are apparently generally applicable. A law of physics that one formulates and studies in the laboratory is held to be true not only there but throughout the universe. For example, if one measures the emission spectrum of helium gas, one does not write a scientific paper concluding, “The spectrum of helium gas in my laboratory throughout July 2007 consisted of the following wavelengths…”, but simply “The spectrum of helium gas consists of the following wavelengths…”. This is, in fact, quite a bold assertion: the claim, validated in reality, is that any scientist who correctly measures the spectrum of any sample of helium gas anywhere on the earth at any time will find the same result. Of course, part of the process of science is to filter out what is irrelevant, such as the phase of the moon, the colour of one’s lab coat, the orientation of the vessel containing the helium, etc. And, following Newton, we are also stating that helium anywhere in the universe has the same spectrum, a claim actually borne out in astronomy. As explored in more detail below, apart from
God’s covenant faithfulness to his creation, there is no reason why this feature of the laws of physics should be so, and all scientists are constrained to work within this framework of the general applicability of the laws of nature. Of course, the very existence of science itself would be impossible otherwise.

God’s Word for the Physical Aspect of Creation

Let us now turn our attention to what Scripture says about the relation of God to the natural creation, particularly in terms similar to our idea of laws of nature. Consider the following key passages in Job, Psalms, and Jeremiah, in which specific words relating to the laws for creation are emphasized.

In speaking with Job, God asks him, “Do you know the ordinances of the heavens, or fix their rule over the earth?” (Job 38:33) In this particular creation story — one of several found in scripture, including Genesis 1, Genesis 2, Psalm 104, Job 38-40, and John 1 — the implication is that while humanity neither understands fully the ordering principles of the creation nor establishes their prescriptive governance over things in creation and their behaviour, God does.

Psalm 148 shows how the non-human creation praises the covenant God by obedience to his decreive word: “Praise Him, sun and moon; Praise Him, all stars of light… Let them praise the name of the LORD, For He commanded and they were created. He has...established [sun, moon, and stars] forever and ever; He has made a decree which will not pass away. Praise the LORD from the earth, Sea monsters and all deeps; Fire and hail, snow and clouds; Stormy wind, fulfilling His word.” (Psalm 148: 3, 5-8) This expresses the conviction that there are decrees which God has established for things in the heavens, and that obedience to the word of God is being manifested in what we would call a natural phenomenon, like the weather. And this obedience is part of what it means for these creatures (sun, moon, stars, sea monsters, oceans, fire, hail, snow, clouds, wind) to praise the Creator.

In Jeremiah 31 and 33, God speaks through the prophet of his faithful governance of creation. “If this fixed order [of sun, moon, stars, and sea] departs from before Me, declares the LORD, then the offspring of Israel also will cease from being a nation before Me forever.” (Jeremiah 31:36) God has laid out a fixed order which he oversees in a similar way to his maintaining a relationship with his people. Then, more explicitly, he reveals himself as a God who compares the covenant he has established with his people to his covenant with his creation: “Thus says the LORD, ‘If you can break My covenant for the day and My covenant for the night, so that day and night will not be at their appointed time, then My covenant may also be broken with David My servant so that he will not have a son to reign on his throne… Thus says the LORD, ‘If My covenant for day and night stand not, and the fixed patterns of heaven and
earth I have not established, then I would reject the descendants of Jacob and David My servant…” (Jeremiah 33:20, 21a, 25, 26a) This covenant is a long-standing agreement of personal, loving, and self-giving relationship with the day and the night. Thus God has instituted and continues to sustain the pattern of day and night, which is one of the regularities relied upon most heavily in daily life. The sun sets, the sun rises, and so when we go to bed at night we set our alarm clocks because we are depending upon and expressing trust in God’s covenant faithfulness because of which this “law of nature” will continue.

From a Christian point of view, science would not be possible were it not for the fact that its foundation is in God’s covenant faithfulness to his creation, for there can be no consistent naturalistic explanation for the regularities of the world which are explored within the natural sciences. That is not to say that it is impossible for unbelievers to do science; on the contrary, God in his (common) grace remains faithful to his creation regardless of the response of his image bearers to his faithfulness. For, as Jesus says in the Sermon on the Mount, “Your Father who is in heaven…causes His sun to rise on the evil and the good, and sends rain on the righteous and the unrighteous” (Matthew 5:45).

The Psalmist Asaph gives praise to God his king by saying, “Yours is the day, Yours also is the night; You have prepared the light and the sun. You have established all the boundaries of the earth; You have made summer and winter.” (Psalm 74:16-17) Demarcations between different types of things and phenomena in creation are possible, such as those between land and water and between the different time periods; Asaph acknowledges God as the one who established these kinds of relationships.

The single most important way to see God’s relationship with his creation is found in Genesis 8:22: “While the earth remains, Seedtime and harvest, And cold and heat, And summer and winter, And day and night Shall not cease.” Here God implements and promises a set of regularities which we can rely upon. God’s covenant faithfulness to his creation, symbolized by the rainbow, is clearly depicted in this passage. Our first response when seeing a rainbow should, therefore, not be to analyze the wonderful colourful patterns due to the frequency-dependent refraction of sunlight by rain droplets, but to be reminded of God’s covenant faithfulness to his creation. In this post-flood declaration, God is saying, “I am providing for the ongoing regularities that you will find within creation.” These kinds of general patterns (yearly and daily cycles) will certainly carry on as a result of God’s remaining faithful to his covenant, and therefore we can depend upon them. God was not constrained of necessity to ordain these particular regularities, but chose to do so out of his goodness.

If we hold strictly to Kepler’s notion that we “think God’s thoughts after him” in terms of our formulation of the laws of physics, we would have to
expect that the way God governs the creation is in fact through the institution and enforcement of laws which have the characteristics like those described above under the heading "Laws of Physics," but fully accurate. Instead, I'm suggesting that our formulation of laws is essentially human and creaturely, and God in his goodness and ordaining power has provided for the possibility of our formulations. The foremost feature of God's word for the physical aspect of created reality is its covenantal character: God makes covenant and faithfully keeps covenant with his creation.

While our laws of physics are descriptive, God's word for physical reality is prescriptive. His fiat is effectual for creation; that is, what God the Creator speaks into being and behaviour is realized.

Some of God's word for the physical aspect of reality has been revealed to us directly in Scripture. For example, the sequence of day and night is not only a regularity which we have experienced, but has been shared with us by God as an aspect of his covenant with the creation. However, God's specific and detailed word for all of the physical reality remains substantially unknowable. Consider, again, Job 38:33: “Do you know the ordinances of the heavens...?” Even the increasing verisimilitude of the laws of physics will not reach the level of total knowledge.

The way in which God sustains the physical aspect of reality reveals certain aspects of God's character: we see God's faithfulness, omnipotence, omniscience, wisdom. For example, when we study electromagnetism in physics, we see that each description and explanation we consider coheres with the other, and we stand back and have to say in amazement how God's wisdom has allowed for such an intricate set of consistent relationships. One can also recognize that God enjoys beauty, and provides for freedom in the context of faithfulness.

The word of God is given to us in the context of the created order. God has spoken to us not only in the Scriptures and through Jesus Christ, but God's word continues to speak created things into being and behaviour through the power of the Holy Spirit. The Triune God is not only transcendent but also shows his immanent presence in the world, and so we experience God's self-revelation through his creation as well (Romans 1:20, Psalm 19). These revelations, often delineated as special and general, inform one another. That is, we advance in our understanding of God through our increasing knowledge of the creation, and vice versa.

It is also helpful to consider the love God has for his creation. This is part of what is being expressed in John 3:16, “God so loved the world...”, where the Greek word translated as “world” is “cosmos.” We often think of God's love for people, but it is clear that God loves all he has made; God's love extends into all of creation. Consider the poetic expression by David: “The LORD is faithful
to all his promises and loving toward all he has made… The LORD is righteous in all his ways and loving toward all he has made.” (Psalm 145:13, 17, NIV) Clearly, God loves not only humans, but shows his love toward the whole creation and provides for it as he sustains it day to day.

The beginning of this love is seen in Genesis 1. In the “Let there be…” fiats, God says, “Allow the following things to have an existence, to have a true and real otherness from me and to have an ongoing character of relationship and regularity that I will sustain.” But the love God has for his creation is not restricted to his creation and preservation of all things; it carries through to his redemptive purposes. So Jesus commands his apostles just prior to his ascension to “Go into all the world and preach the gospel to all creation.” (Mark 16:15; italics added) Part of our task as Christians in the sciences is to unfold and direct the creation so as to enhance its ability to praise its Creator; in this way, we preach the gospel — that “the kingdom of heaven [God] is at hand” (Matthew 4:17 [Mark 1:15]) — to all creation. For example, in our application of the laser to eye surgery, we participate in the continuation of Christ’s redemptive work by restoring sight to the blind. This is what Paul addresses in Romans 8:19-22: “For the anxious longing of the creation waits eagerly for the revealing of the sons of God. For the creation was subjected to futility, not willingly, but because of Him who subjected it, in hope that the creation itself also will be set free from its slavery to corruption into the freedom of the glory of the children of God. For we know that the whole creation groans and suffers the pains of childbirth together until now.”

Scientific Law and God’s Rule

One of the main things we’ve inherited in the scientific enterprise is the concept that the laws of nature, and nature itself, are mechanical. This conception, however, is not consistent with a Christian understanding of the world or of how God relates to the world. God doesn’t “simply” set up a mechanism and have that mechanism carry on over time. That would be a world of deism, a world where God is not personally, intimately, covenantally, faithfully relating but simply has set it up in a certain way and then no longer engages it. A number of authors have written similarly regarding the way in which God governs the world by means of his word. Vern Poythress, mathematician and theologian, writes, “The Bible shows us a personalistic world, not impersonal law. What we call scientific law is an approximate human description of just how faithfully and consistently God acts in ruling the world by speaking. There is no mathematical, physical, or theoretical ‘cosmic machinery’ behind what we see and know, holding everything in place. Rather, God rules, and rules consistently.” Poythress here argues that instead of machinery underlying the world at its basic, fundamental level, God created and continues to sustain the cosmos.
Electricity and gravity (for example) are not “impersonal forces”, but they are our experience of God’s word for creation which he expresses in covenant faithfulness; they are God’s tri-Personal demonstration of his providential love for all he has made. That is, our natural scientific laws are how we see and describe the result of God’s word for creation.

The word of God is shown as having effected the creation of the world in Genesis 1 (“Then God said, ‘Let there be…’, etc.), and in John 1:1-3 the Word of God is clearly identified as the Person of Jesus Christ; through Jesus Christ, God brings about the world and everything that was made. Poythress also writes, “The real laws are in fact the word of God, specifying how the world of creatures is to function. So-called ‘law’ is simply God speaking, God acting, God manifesting himself in time and space.”

Having spoken the creation into existence, God reveals himself by continuing to sustain the universe and speaking it into the behaviour which fulfills his purposes.

We find similar convictions in the writings of Reformed theologian Herman Bavinck. “The worldview of Scripture and of all of Christian theology…seeks…to discover the harmony that holds all things together and unites them and that is the consequence of the creative thought of God.” Here Bavinck is clearly thinking of Paul’s writing about Christ: “He is before all things, and in Him all things hold together” (Colossians 1:17). The author of Hebrews says that Christ “upholds all things by the word of His power” (Hebrews 1:3). Opposing deism, Bavinck writes, “All these elements and forces with their inherent laws, according to the theistic worldview, are from moment to moment upheld by God, who is the final, supreme, intelligent, and free causality of all things. As creatures, they have no stability or durability in themselves. It is God’s omnipresent and eternal power that upholds and governs all things.”

One tension here — between a notion of “inherent” laws (which makes it seem like “elements and forces” have something intrinsic or autonomous) and having “no stability or durability in themselves” — is resolved by emphasizing the nature of God’s relationship with the world in which he covenantally binds himself to governing with regularity. This covenantal approach also helps nuance the confession that “God…is the…free causality of all things”, thereby adding to the rightful acknowledgment of God’s omnipotent autonomy the recognition of his constraining himself to a certain set of dependable regularities. Finally, it is helpful to envision “God’s omnipresent and eternal power” not as raw impersonal strength but as a Personal presence mediated and exerted by Word and Spirit. A Trinitarian perspective on the relationship between God and creation is valuable not only in distinguishing a Christian perspective from a generally theistic one, but also in mining the depths of the Scriptural account in this regard. Consider, for example, Psalm 33:6, “By the word of the LORD the heavens were made, And by the breath of His mouth all their host.” Noting
that the Hebrew word translated as “breath” here (ruach) is routinely used for the Holy Spirit, we see the involvement of each Person of the Trinity in the creation.  

**Habits of Mind to Develop in Doing and Thinking about Science**

While there are certainly many motivations for doing science, Christianity offers a number of excellent ones. As McGrath discusses in detail, Christians see nature (the object of study of the natural sciences) as creation, in fact, as the creation of the Triune Creator we worship. Therefore in doing science, Christians seek to deepen in their knowledge of the Creator, to fulfill the cultural mandate, to embrace and employ God’s good gift of curiosity, and to see order as both gift and task, and in doing so, seek to glorify God.

In closing, consider the following set of fourteen theses on science, seven negative and seven positive. These represent appropriate habits of mind which should be developed by members of the general public as well as scientists involved in teaching or research, especially if one wishes to think about science from an explicitly Christian point of view. It is particularly important for Christian teachers of science both to exhibit these habits of mind and to encourage their development in their students.

**Thesis 1.** Science is not a source of certain knowledge, for it is done by fallible human beings, and there are other ways of knowing besides the scientific.

**Thesis 2.** Science is neither in opposition to nor irrelevant to religion, despite raucous claims to the contrary from the dogmatic atheists such as Dawkins. It is not able to replace God as an explanation, basically because of ultimate questions which science cannot answer, such as: “Where did the universe come from?”, “How did it really start?”, “What really makes things happen?”, and “What is the purpose of it all?”.

**Thesis 3.** Science is not able to understand the mind of God: our laws are not his laws (c.f. Isaiah 55:8-9). While we formulate laws in science, any laws by which God governs the creation are of a different nature (e.g. covenantal, holistic).

**Thesis 4.** Science is not purely objective or systematic, but certainly more objective than many other areas of study and certainly quite systematic. There remain elements of subjectivity and accident.

**Thesis 5.** Science is neither a set of facts (there are no “brute” facts anyway), nor the art of fact-collection (although fact-collection is a significant part of science).

**Thesis 6.** Science is not easily definable, as can be seen by attempting a simple demarcation of science from pseudo-science, folk-science, and astrology.
Laws of Nature and God's Word for Creation

Thesis 7. Science is not a straightforward march of progress; there are many blind alleys, and dead-end roads.

Thesis 8. Science is a cultural activity, being a response to the cultural mandate and similar to other human activities in many ways (e.g. rooted in religion, creativity required, interaction with others, historical development).

Thesis 9. Science is possible because of God’s covenant faithfulness to creation. (This is also why people set alarm clocks.) Regularity is essential for science; however, our formulations of the regularities should not be equated with God’s faithfulness (e.g. the Pythagorean theorem is not true in the apparently non-Euclidean geometry of the real world), and neither should we think of science as being totally regular (within physics, quantum physics and chaos theory display significant “irregularities”, all the while not exhibiting total randomness either).

Thesis 10. Science is founded largely upon Christian convictions. Many early scientists were Christians, or at least lived in a society which was largely Christian. But it is important to remember that there were other influences as well: political, military, technology, printing press, voyages of discovery.

Thesis 11. Science is something which can be used either for good or for evil. This is the directional aspect of the “structure and direction” discussion of Wolters.

Thesis 12. Science is a complex web of theory and experiment. Often what we see, and how we see it, depends on what we’re looking for.

Thesis 13. Science is able to deepen our understanding of the created world. Scientists are realists: the world really exists and its reality is what we are working on understanding.

Thesis 14. Science is able to deepen our knowledge of the Creator through general revelation — the wisdom, power, activity of God are evident — and so further enables us to achieve our chief end, namely, “to glorify God and enjoy him forever.”

Endnotes:

1 This is a slightly expanded transcript of a Geneva Classroom Lecture given at Trinity Western University on 28 March 2007, sponsored by the Geneva Society. Unless otherwise indicated, Scripture is taken from the New American Standard Bible.

2 In some cases, of course, the classification is not without difficulty. This points to the limitations and complexity of theoretical analysis. For example, not all living creatures fit neatly into the plant or animal “kingdom”, requiring more careful definitions and the development of new categories beyond those of what might be called pre-theoretical thought. And the distinction
of liquids from gases fails when we consider the critical point. The refinement of classification schemes is one of the aims of science.

3 For a thorough analysis of the history of the concept of natural law, not attempted in this paper, see M. D. Stauffer, “The Idea of Natural Law,” *Philosophia Reformata* 64 (1999), 88-104.

4 This is not meant to imply that there is usually a plethora of candidate laws; the opposite is actually the case, as discussed in John Polkinghorne, “What was Happening?” In *Rochester Roundabout: The Story of High Energy Physics* (New York: W.H. Freeman & Co., 1989), 158-176.


6 Bavinck makes a similar point, speaking against naturalism: “If this world with its naturally immanent forces and laws is the only world...then of course we have to be content with it. Then the laws of nature are identical with the decrees of God.” Herman Bavinck, *Reformed Dogmatics* [Gereformeerde dogmatiek], ed. John Bolt, trans. John Vriend (Grand Rapids: Baker Academic, 2003), v. 1, p. 376.

7 This has been most famously discussed in Eugene Wigner, “The Unreasonable Effectiveness of Mathematics in the Natural Sciences,” *Communications on Pure and Applied Mathematics* 13 (1960), 1-14.

8 There does remain a certain sense in which our understanding of the creation is due to revelation to us by the Creator. This is explored in Tim Morris and Donald N. Petcher, *Science & Grace: God’s Reign in the Natural Sciences* (Wheaton, IL: Crossway Books, 2006), 216-20. This is in addition to the ways in which the Creator reveals himself to us in and through the creation.

9 “We may firmly believe what we might conceivably doubt; and may hold to be true what might conceivably be false.” Michael Polanyi, *Personal Knowledge: Towards a Post-Critical Philosophy* (Chicago: University of Chicago Press, 1962), 312.


11 These factors might actually play a role, but not measurably so in the case of helium’s spectrum. However, certain systems cannot ever be isolated from their environment; for example, the atmosphere is known to be a chaotic system which, because it exhibits sensitive dependence upon initial conditions, is prone to influence from literally all parts of the universe. See James Gleick, *Chaos: Making a New Science* (New York: Viking, 1987).

12 See, for example, Jennifer Wiseman, “What do we Learn about the Creator from Astronomy and Cosmology?” In *Not Just Science: Questions Where Christian Faith and Natural Science Intersect*, eds. E. David Cook and Dorothy F. Chappell (Grand Rapids, MI: Zondervan, 2005), 97-109. The latter point about “freedom in the context of faithfulness” was made during her public lecture at Trinity Western University on 16 October 2006.


16 Ibid., v. 1, p. 370.
Laws of Nature and God’s Word for Creation

17 Poythress, Redeeming Science, 25. Other excellent resources in this respect are the writings of Meredith Kline, Colin Gunton, and Thomas Torrance, as well as Morris and Petcher, Science & Grace.


19 These last two points, regarding curiosity and gift/task, are explored in detail in Morris and Petcher, Science & Grace.

20 Adapted from “Aspects of a Christian Perspective on Science”, a presentation I gave for a collaborative science curriculum writing session for principals and teachers of northwest Iowa Christian schools held at Dordt College on 6 May 2002.


23 Sikkema, “Death of the Watchmaker.”


27 This is discussed, along with related issues, in Kuhn, The Structure of Scientific Revolutions.

28 A good presentation of critical realism as a cornerstone of a Christian understanding of science is given in J. C. Polkinghorne, Belief in God in an Age of Science (New Haven, CT: Yale University Press, 1998).

29 Westminster Shorter Catechism, Answer 1.