

# Chaos and Chaos-Complexity Theory: Understanding Evil Forces with Insights from Contemporary Science and Linguistics

E. Janet Warren



E. Janet Warren

*Since the Bible lacks a cohesive demonology, scholars tend to either maximize or minimize the ontology of evil. I suggest two solutions to reconcile these views: metaphor theory can elucidate the diverse biblical descriptors, and chaos-complexity theory can provide a model for demonology. Metaphors/models can depict reality, are frequently used in science, and are especially relevant to supersensible realities. Chaos-complexity theory describes systems that are nonlinear, sensitive to feedback, and self-organizing. Using it as a model for demonology can help reconcile biblical ambiguities and ontological perspectives. Demons can be compared with insect swarms, having minimal individual ontology, but capable of self-organizing into powerful forces.*

Demonology is particularly relevant today because of the growth of Christianity in the Global South. It is a difficult area of study for three reasons: this reality is inaccessible to the usual senses, biblical references to Satan and evil spirits are scattered and often obscure, and there are large cultural differences. Although not usually explicit and intentional, scholarly and popular writers on the subject can be classified into two groups: ontological maximizers and ontological minimizers.<sup>1</sup> The first group comprises most popular writers, as well as some academic authors. Perhaps, in an attempt to fill the biblical “gaps,” they view the demonic “kingdom” as highly organized, with Satan as the commander in chief; there is a hierarchy of evil spirits, many with specific names and functions, which seek to attack Christians. The second group, largely academicians, believes demonology is not relevant in contemporary Christianity, or that evil spirits are symbolic of psychological projections.

I suggest many of the above inconsistencies can be addressed and perhaps clarified by considering, first, metaphor theory and, second, chaos-complexity theory as a model for demonology. The aim of this article is to apply insights from contemporary linguistics and scientific chaos-complexity theory to further our understanding of evil spirits. Using different models with which to understand a topic can provide a fresh perspective and perhaps further insight. First, I briefly review some biblical ambiguities, and then discuss those who maximize and those who minimize the

**Janet Warren** is a family physician in Guelph, Ontario, Canada, with a special interest in counseling and deliverance. She received her BSc in psychology from McMaster University, her MD from the University of Toronto, her MTS from Tyndale Seminary, and is currently completing her PhD in charismatic theology at the University of Birmingham, UK. Her thesis, “Cleansing the Cosmos,” develops a biblical model for conceptualizing and counteracting evil using nonwarfare metaphors. Janet is a member of the Christian Medical Dental Society, the Society for Pentecostal Studies, and the American Scientific Affiliation. When her PhD is complete, she hopes to continue working in both medicine and theology, incorporating sessional teaching as well as writing.

# Article

## *Chaos and Chaos-Complexity Theory*

ontology of evil. Possible solutions to the confusion are then investigated. The contributions of metaphor theory are discussed, in addition to its use by science with regard to evil. Next, chaos-complexity theory is described along with its application to theology. Finally, the application of chaos-complexity to demonology is discussed.

Chaos can have three meanings, which are related. In common usage, it means complete disorder; in ancient literature, including the Old Testament, it is juxtaposed to cosmos and is a metaphor for evil; and in science, it is used to describe phenomena that appear disordered but are actually governed by simple rules. The hypothesis of this article is that evil forces are, in fact, complex systems not amenable to classification or confident descriptions. Biblical chaos and scientific chaos are thus related. This relationship may shed light on the apparent ambiguity of biblical references as well as perhaps reconcile the ontological perspectives on evil spirits.

## Biblical and Experiential Ambiguities

The Bible does not present a cohesive, consistent, and clear demonology; references are scattered, and there is ambiguity. The following examples illustrate this (without consideration of hermeneutical complexities). Numerous terms are used to describe spiritual forces of evil; some are fairly clear (demons), others more obtuse (powers); some are clearly metaphorical (darkness), others more personal (Satan). Evil spirits are often depicted as animals, including dragon (Isa. 27:1; Rev. 12:9), serpent (Rev. 12:9), locust (Rev. 9:3, 7), and scorpion (Luke 10:19; Rev. 9:3). They are described as inhabiting humans (Luke 22:3), animals (Mark 5:1–13), the air (Eph. 2:2), the earth (Rev. 12:4), the heavens (Eph. 6:12), and prison (1 Pet. 3:19). Some verses suggest that Satan is merely a servant of God (e.g., Judg. 9:23; 1 Cor. 5:5); other verses claim that he is an enemy of God who actively opposes Christians (e.g., Zech. 3:2; Matt. 13:39; 1 Pet. 5:8).

In the Old Testament, evil is primarily symbolized by darkness, the deep, and chaos. In the Gospel of John, evil is depicted as darkness, whereas in the synoptic Gospels, demons and unclean spirits are the favored terms. Within the Synoptics, there is

ambiguity in the descriptions of demons with regard to *number* and *name*. For example, with respect to *number*, the unclean spirits in the stories of the synagogue and of the Gerasene demoniacs, are described by both singular and plural pronouns (Mark 1:21–27; Luke 4:31–37; Matt. 8:28–34; Mark 5:1–20; Luke 8:26–39). With respect to *name*, the woman healed on the Sabbath is crippled by a “spirit” and bound by “Satan” (Luke 13:11, 16); also, in Luke’s summary in Acts, Jesus is described as healing those afflicted by the “devil” (10:38), whereas the gospel accounts describe people as afflicted by “demons.”

Many statements about demons appear only once: request for a demon’s name (Mark 5:9; Luke 8:30), reference to a “kind” of demon (Mark 9:29), and reference to “more evil” demons (Matt. 12:45). There is also a vague relationship between sin and the demonic (e.g., Eph. 4:26, 27). These apparent inconsistencies are perhaps a result of difficulties inherent to all biblical interpretation (cultural gap, etc.) or perhaps because the nature of evil spirits is intrinsically ambiguous.<sup>2</sup>

Furthermore, there is much confusion surrounding experiences of demonization in missiology and contemporary deliverance ministries. Within a worldview that is accepting of evil spirits, beliefs are very different from those accustomed to a rationalistic worldview. In traditional African religion, for example, evil spirits are believed to be highly involved in everyday life.<sup>3</sup> In Western cultures, at least until the recent New Age Movement, spiritual beings have been disregarded. In contemporary charismatic Christianity, some believe demonization is rare;<sup>4</sup> others claim that everyone is demonized to a degree.<sup>5</sup> Ideally, beliefs regarding evil spirits should concur with both biblical evidence and experience, but this has not proved an easy task.

## Ontological Maximizers

Given the apparent ambiguities discussed above, it is perhaps understandable that many writing on demonology attempt to “fill the gaps.” They often come to confident conclusions, and it is not always clear whether these are biblically or anecdotally based. Merrill Unger, in his classic work on biblical demonology, refers to Satan’s “highly organized empire of roving spirits.”<sup>6</sup> He further divides this into a Satanic order of the earth (ruling over humankind)

and of air (ruling over fallen spirits).<sup>7</sup> He claims that demons can adopt human form, “possess personality, are everywhere presented as intelligent and voluntary agents,” and possess superhuman knowledge and strength.<sup>8</sup> Missiologist Charles Kraft believes that Satan is a high-ranking angel, akin to an archangel, and that demons are “ground level” troops which take their order from those further up in the hierarchy.<sup>9</sup> He also interprets the Pauline powers as cosmic-level principalities, which have authority over places, social organizations, and sinful behaviors. Roman Catholics Michael Scanlan and Randall Cirner describe different types of spirits such as anger, fear, insecurity, depression, and bitterness. They note that spirits can cluster, for example, “a spirit of guilt may involve self-condemnation, shame and unworthiness,” and they believe that sin provides an entry point for demons.<sup>10</sup>

Even some conservative scholars are confident in their conclusions. Bruce Waltke, for example, asserts that it is “clear this anti-kingdom host is organized, not disorganized.”<sup>11</sup> Theologian Gregory A. Boyd claims that the biblical belief is that the world is “virtually infested with demons” and “the number of these demons was indefinitely large.”<sup>12</sup> These beings, described as an “army of demons,” possess free will and are morally responsible.<sup>13</sup> Boyd asserts that demons and the powers exist in a hierarchy, although he admits that we do not know the details. These authors make some valuable contributions to demonology; however, I believe that many authors are overly confident in their conclusions and do not consider the ambiguity of the biblical evidence. In addition, many scholars conflate exegesis and experience. There have been many critiques, especially of the popular literature, but seldom are constructive alternatives suggested.<sup>14</sup> Perhaps in an attempt to bring balance, some scholars go to the opposite extreme in denying the reality of evil spirits.

## Ontological Minimizers

The idea of evil having little or no ontological status has been discussed from biblical and theological perspectives. With respect to the Bible, many of the claims about the unreality of evil spirits are based on interpretations of the Pauline powers, Walter Wink being perhaps representative of this position. In his well-known trilogy, he advocates a demythologizing

approach to the powers.<sup>15</sup> He thinks that the ancients only personified evil forces because they had no other way of describing them and that it is “impossible” for moderns to “believe in the real existence of demonic or angelic powers.”<sup>16</sup> Wink believes that the powers are a “generic category referring to the determining forces of physical, psychic, and social existence”; they consist of an outer, visible manifestation (e.g., political institutions) and an inner spirituality or interiority; and they “must become incarnate, institutionalized or systemic in order to be effective.”<sup>17</sup>

In theology, there is a long tradition of viewing evil as nonbeing. A well-known variation of this is Karl Barth’s confusing idea of “nothingness,” which refers to the chaos and evil in the world that is antithetical to God.<sup>18</sup> Barth describes it as a malignant, perverse being that is equated with darkness, evil, chaos, demons, and Hades.<sup>19</sup> Although nothingness lacks ontological status, he claims that nothingness, sin, evil, death, the devil, and hell are very real. Nothingness attains reality, or a concrete form, through death, sin, and the devil. Demons are “null and void,” but not nothing, although they arise from nothingness.<sup>20</sup> Barth has been criticized mostly because of the confusion surrounding the difficult language and ontology of nothingness.<sup>21</sup>

It is appealing to many to minimize the ontology of evil, but this approach does not reconcile well with the gospel portrayal of demons and is also not helpful to those in missions and counseling who deal with people to whom evil spirits are a daily reality. Since neither extreme of maximizing or minimizing the ontology of evil spirits is satisfactory, it is prudent to investigate alternative approaches.

## Solution 1: Metaphor Theory

To my knowledge, there has been no systematic application of metaphor theory to demonology. This is surprising because unseen realities are best, if not only, described using metaphors. Biblical metaphors for evil are common in the Bible, and authors often layer multiple metaphors. Isaiah associates chaos, the wilderness, the desert, demons, Lilith, and wild animals (Isa. 34:9–15). The story of the Gerasene demoniac contains an overabundance of metaphors: demons, death, unclean/wild animals, wilderness, the sea, and the abyss (Matt. 8:28–9:1; Mark 5:1–20;

# Article

## *Chaos and Chaos-Complexity Theory*

Luke 8:26–39). Paul mentions Beliar, darkness, lawlessness, and idolatry in binary opposition to Christ, light, righteousness, and the temple (2 Cor. 6:14–16). John uses multiple metaphors—devil, Satan, dragon, serpent—to describe the ultimate evil being (Rev. 12:9; 20:2). Recognizing the metaphorical function of these terms can perhaps elucidate some of the interpretive difficulties as well as further our understanding of demonic ontology.

Contemporary metaphor theory claims that metaphors go beyond ornamentation or simple substitution and have semantic power.<sup>22</sup> They are cognitive and conceptual; they can afford new meaning and assist with organization of concepts.<sup>23</sup> Metaphors are universal and frequently unconscious, guiding thoughts as well as language. They have the power to depict reality and are frequently multivalent and multilayered. Models are larger variants of metaphors, being described as sustained and systematic metaphors,<sup>24</sup> or imaginative tools for ordering experience.<sup>25</sup> More than one model is usually needed to describe a difficult concept; multiple metaphors provide multiple snapshots of reality.

Metaphor theory is particularly applicable to supersensible reality which can only be described using figurative language. Typically, metaphor works because we know one realm better than the other. Thus the spiritual realm can be described using images from the physical realm. Biblical scholar G. B. Caird believes almost all language about God is metaphorical and emphasizes the cognitive function of language, “illumination of the unknown by the known.”<sup>26</sup> Although metaphors have been discussed in reference to the divine, they are equally applicable to the demonic. The scattered and multiple biblical metaphors for evil spirits can be viewed as each providing one snapshot of this unseen reality. Taking them together and recognizing that they depict reality can enrich our understanding of demonology, as well as bridge the gap between maximizers and minimizers.

Some scholars appear to apply linguistic insights without elaboration on metaphor theory. Old Testament scholar Walter Brueggemann claims that the different terms for chaos can be summarized as death or nihil.<sup>27</sup> New Testament scholar Clinton Arnold does not explicitly refer to linguistics, but in a table listing “the powers of darkness in Paul’s

letters,” he includes Satan, devil, evil one, prince, spirit, Belial, the enemy, the tempter, the god of this world, angel, principalities, powers, dominion, thrones, world rulers, spiritual hosts, elemental spirits, and demons.<sup>28</sup> He suggests that Paul drew from a reservoir of terms and “lumped all manner of spirits together.”<sup>29</sup> Historian J. B. Russell thinks that the relationship between the devil and demons is blurred; reality and perceptions of it are complex and “multiplicity produces a view of the world that is rich and broad.”<sup>30</sup>

These scholars recognize that no one term is adequate to describe the complex biblical reality of evil. Instead, multiple metaphors are needed to give insight into the unseen realm of evil. It makes sense to consider the metaphors as a group rather than isolating individual metaphors and then making generalizations (as some ontological maximizers have done). Attempts to determine precise causal and other relationships between the various terms are likely to be fruitless and lead to confusion. Recognizing that demonology is best described using figurative language and that metaphors have the power to depict reality may help reconcile ontological maximizers and minimizers.

Metaphor theory allows us to affirm the reality of evil spirits, while recognizing that the language used to describe them is not precise. This helps reconcile the differing depictions of evil in the Bible. In addition, Barth’s confusing term “nothingness” can be clarified by labeling it as a metaphor. An emphasis on metaphors for evil may also improve comprehension of the nature of evil spirits and how to deal with them. Metaphor theory provides valuable insight into biblical and experiential evil, but there is still potential confusion regarding which metaphor to privilege or how to hold all metaphors together conceptually. Given the multiplicity of metaphors for evil forces, it might be helpful to determine what type of framework is most helpful for organizing the various terms. Scientific models prove helpful in this regard.

## Science and Metaphors

Using science to enlighten us regarding demonology may appear strange; demons are hardly amenable to scientific analysis. Scientific inquiry does not usually examine evil, but, like the Bible, includes the



polarities of chaos/cosmos and light/dark. Science also deals with unseen realities and derives conclusions based on observations of known realities. Partly for this reason, the science-religion dialogue has progressed in the last four decades. Science has long recognized the value of metaphors and models to gain understanding of both small- and large-scale phenomena. Max Black describes various types of models, the theoretical (which attempts to describe unseen reality, or to offer an explanation for observed phenomena, such as Bohr's model of the atom) being the most relevant.<sup>31</sup> The model is taken from a familiar realm and applied to an unfamiliar one; one is used as a lens through which to see the other. Scientist-theologian Ian Barbour notes the similarities between scientific and religious models. Both are analogical, help order and explain observations, offer partial views of reality, and recognize that all experience is interpreted. Theoretical models are "postulated by analogy with familiar mechanisms or processes and used to construct a theory to correlate a set of observations."<sup>32</sup> They function to understand reality and although not a literal picture, often make some ontological claims. Barbour points out that in contemporary science many phenomena require more than one model, often complementary.<sup>33</sup> It is increasingly recognized that contemporary science talks more of models than of laws.<sup>34</sup>

With respect to historical context, Newtonian physics dominated science for two centuries. Newton's laws describe simple, linear systems and claim that with the correct information, anything can be predicted; the universe operates with stability and reliability. Newtonian physics is reductionistic in that complexities of nature are assumed to have underlying, yet undiscovered, simple laws. Philosophically, this led to a mechanistic and deterministic worldview; the "clockmaker" God simply establishes the laws and lets the universe run on its own. However, science in the past century has radically altered theological views. Newtonian science has been challenged by quantum mechanics, which asserts that certain interactions are inherently unpredictable;<sup>35</sup> by chaos-complexity theory, discussed below; and by the recognition that there is much that remains unknown in the universe, such as dark matter and energy.

There have been some, albeit limited, applications of scientific theories to the study of evil. Field theory

has been used by Wolfhart Pannenberg mostly as a model for the action of the Holy Spirit, but he also suggests that evil spirits may operate as fields of force.<sup>36</sup> Robert John Russell has used entropy (the theory that all matter and energy tend toward increasing disorder) as a model of evil. He notes that both evil and disorder increase chaos in the world and that both are dependent on being: "as in theodicy, entropy is parasitic to natural processes."<sup>37</sup> He does not discuss demonology. The new science of chaos-complexity has not, to my knowledge, been applied to the study of evil and demonology.

## Solution 2: Chaos-Complexity Theory

Put simply, three types of systems can be described: simple (a recipe, which follows an easy formula), complicated (a rocket ship, which requires multiple formulae as well as expertise), and complex (interpersonal relationships or the weather, which are generally unpredictable, influenced by multiple variables, and not amenable to formulaic analysis). It is this last category, highly intuitive but only relatively recently studied, which is of interest here. Chaos-complexity theory is based on observations that many systems (e.g., insect colonies, stock markets, weather) are non-linear and do not obey simple laws. Chaos theory developed from the pure sciences in the past half-century; complexity theory, which is related to chaos theory, is a more recent development. They are similar enough to be combined.<sup>38</sup>

In chaos theory, simple laws can have complicated consequences; in complexity theory, complex causes can produce simple effects, or complex systems exhibit can simple behavior. Chaos can be defined as a system in which small changes in the initial condition of processes produce big changes in the outcome; complexity can be defined as a system that is chaotic and develops through a process of feedback on itself.<sup>39</sup> A complex system is "a system that is made up of several simpler components interacting with one another."<sup>40</sup> Edward Lorenz, a meteorologist, postulated the now famous "butterfly effect": a butterfly flapping its wings in Brazil can cause a tornado in Texas.<sup>41</sup> Weather results from an interaction of multiple factors such as collisions of millions of miniscule molecules of air and water.

# Article

## *Chaos and Chaos-Complexity Theory*

Both chaos and complexity are nonlinear, arising through the interaction of small numbers of simple components, and challenge the assumption that complicated behavior arises from complicated rules or as a result of interactions of simple components. Nonlinear systems are “neither ordered nor random but combine elements of both kinds of behavior in a very elusive but striking manner.”<sup>42</sup> They are flexible and open to novelty. The primary characteristics of chaos-complexity can be discussed under the headings nonlinearity and self-organization.

### Nonlinearity

In nonlinear dynamic systems, interactions are not proportional, often following exponential growth curves with a consequent growth of uncertainty. The relationships between variables are unstable and as the number of components increase, the number of interactions between them increases faster. Complex systems are extremely sensitive to small changes in initial conditions (two points starting out close become exponentially further away) as well as being sensitive to ongoing feedback. Minor changes produce maximal effects. The maxim “the straw that broke the camel’s back” illustrates this well. When chaos is present, negligible effects are no longer negligible. Although we can observe the effects, we cannot know all the variables. In addition, continuous positive feedback into a system results in exponential and complex behavior. Common examples of such systems include traffic jams, stock markets, child development, and population growth.

### Self-Organization

Aspects of self-organization in chaos-complexity theory include self-similarity, attractors, boundedness, stretching and folding, bifurcations, self-organized criticality, and emergence. Self-similarity describes repetitive and similar patterns within complex systems. This is known as a fractal, “a geometric form with fine structure on all scales of magnification.”<sup>43</sup> These nonsmooth and ubiquitous geometrical structures appear to be an inherent characteristic of nonlinearity, can be produced by simple mathematical formulae, and are evident in a wide variety of natural phenomena (e.g., a coastline).

Attractors are theoretical components of a complex system to which other aspects are drawn. These are postulated to explain the convergence of compo-

nents in a system close to a particular point. There may be one attractor or several attractors within a basin of attraction. Some systems start out similar but end up very different. In the long term, the system selects, or settles down to, the simplest set from all possibilities (e.g., a marble in a bowl settles to a position of minimal energy; water on the top of a cliff will run to either valley). Any complex system settles at the equilibrium point between forces of attraction and repulsion. It can also be described as *bounded*, in that all points remain within certain boundaries, and as *adaptive*, in that the components respond collectively to changes in circumstances.

A similar characteristic of complex systems is the notion of stretching and folding. Systems expand to a certain point and then fold into the basin of attraction. When exponentiality and uncertainty get too large, the system folds back on itself, thus increasing its stability. Stretching and folding describe two conflicting tendencies: components are torn apart, but because they are bounded, they fold back. This appears to be a basic component of complex-chaotic systems. A related aspect is the phenomenon of bifurcation. Systems that are developing in a nonlinear manner become unstable, and once they reach a critical point, they will often split into two more-stable systems. In addition, these successive bifurcations will “nest” into each other and become self-similar fractals (e.g., the flow of a tap represents an endless process of bifurcation).

Following from bifurcations are the self-organizational tendencies of chaotic-complex systems. As a system extends far from equilibrium, it tends to self-organize to states of greater stability; this often occurs at critical bifurcation points. There is thus the emergence of simplicity on a large scale; dynamical systems have the capacity to generate stable structures. This is known as self-organized criticality because the system arranges itself at a certain critical point. In the light bulb experiment, a network of bulbs programmed to turn on or off with simple rules will settle into a limited and stable pattern out of the thousands of possibilities. This phenomenon can be observed in a pile of sand which will topple when only one more grain is added. Schools of fish self-organize by following two simple rules: follow the fish in front and keep pace with the fish beside.<sup>44</sup> Self-organization can also be observed in “swarm intelligence,” insects which can organize without

a leader, especially if they have similar goals. Paradoxically, order exists within most forms of chaos.

## Chaos-Complexity and Philosophy

Chaos-complexity theory has been applied to and transformed many fields and subfields of diverse disciplines, including anthropology, biology, business management, chemistry, economics, and psychology. It has provided a new framework or model with which to understand many aspects of life. Interestingly, this shift in scientific worldview, from linear/deterministic to nonlinear/chaotic has coincided with a similar shift in sociology, from modern to post-modern.<sup>45</sup> Both contemporary sociology and science recognize the contribution of multiple variables to a system, and that most phenomena in life are irreducibly complex. Chaos-complexity theory can be seen as a paradigm shift, although critics are concerned about its over-application (e.g., one cannot postulate small changes as an explanation for evolutionary processes; a sand pile may change but it never becomes a cube).

Not surprisingly, many scientists have noted the philosophical implications of chaos-complexity theory. It is generally agreed that reductionism is no longer adequate as a way of viewing reality.<sup>46</sup> The whole is greater than the sum of its parts and nonreductionist strategies need to be employed; the context as well as the content is important.<sup>47</sup> Newtonian science viewed the universe as a web of causalities; now it is considered more helpful to look for patterns, not isolated steps of causality; convergence, not contingency, is emphasized.<sup>48</sup> Scientist-theologian John Polkinghorne concludes that "the nature of the causal nexus of the world is ultimately a matter for metaphysics rather than physics."<sup>49</sup> Ian Stewart rephrases Einstein's famous assertion that God does not play dice into a question and suggests that a better question is, "given some particular subsystem for the real world, is it best modeled by a deterministic mathematical system or a random one?"<sup>50</sup> He further notes that only the model is truly random or deterministic, since chaos is multifaceted. There can be no truly fundamental theories, only approximations within a defined domain; the result is a "pluralistic patchwork of locally valid models."<sup>51</sup> Leonard Smith believes that this increases human

responsibility as we need to distinguish between models and reality and decide whether they are similar enough; having the wrong model leads us to ask the wrong questions.<sup>52</sup>

## Chaos-Complexity and Theology

Chaos-complexity theory has been applied to theology, mostly with respect to the God-world relationship, and the determinism-free will debate. Many scientist-theologians stress the openness of creation and believe that God acts in the world through the small changes characteristic of chaotic-complex systems. Polkinghorne, perhaps representative, claims that God interacts through "information input" into dynamic processes.<sup>53</sup> God's activity may be discernible only in hindsight as it is hidden "within the unpredictable flexibility of cosmic process."<sup>54</sup> With respect to evil, he believes that God respects the freedom of both the creature and the creation and is self-limited by the degree of openness of the process.<sup>55</sup> Polkinghorne does not address demonology.

Boyd follows Polkinghorne in arguing that God is sovereign but can tolerate risk in creation. As chaos-complexity theory describes how the world can be predictable without being meticulously coercive, so God does not have to be omni-controlling.<sup>56</sup> This reconciles the idea that God can accomplish his purposes but still allow significant freedom to his creatures. Boyd also points out that sensitivity to initial conditions may explain the unpredictability of evil "natural" events.<sup>57</sup> Uniquely, he suggests that because evil spirits have free will, they can influence so-called "natural" evil events, like tornadoes.<sup>58</sup> However, as discussed earlier, he seems to describe evil spirits in a linear, deterministic manner and does not consider that evil spirits themselves may be a complex system.

Sjoerd Bonting more deliberately develops a "chaos theology."<sup>59</sup> He equates scientific chaos with primeval chaos, which he believes to be uncreated and morally neutral, but a source of creativity and evil.<sup>60</sup> In creation, God orders this chaos, but some chaos remains and continues to threaten creation in the form of evil (this can also explain "natural" evil arising from the chaotic behavior of complex systems). He agrees that God can act through chaos



# Article

## *Chaos and Chaos-Complexity Theory*

events. Bonting briefly dismisses Satan as having no relationship to evil. The application of chaos-complexity to theology is still in its infancy, and there are likely many other potential applications, one of which is demonology.

### Chaos-Complexity and Demonology

The different facets of this theory can be applied to demonology in many ways. Although it may be intuitive that evil spiritual forces constitute a chaotic-complex system, the limitations of this comparison should be recognized. Unlike ant colonies, evil spiritual forces are unseen; therefore there is little hope of ever “proving” such a theory through experimental observations. Chaos-complexity theory can only be used as a model. However, as discussed above, models are capable of depicting reality.

The first application of chaos-complexity to evil is the potential influence of demons on complex systems. All natural systems are open and dynamic, involving multiple interactions with their environment, and are inherently unstable. This has been discussed by Bonting, and more explicitly by Boyd. Demons can be considered as having a large effect by influencing small factors. This has implications for discernment. If evil is viewed as a result of a complex interaction of multiple factors, including diabolical persuasion, demonic affliction, human choice (sin), and possibly random factors, then discernment involves not simply a “black-and-white” decision about whether demons are the cause of a problem, but a consideration that demons may be one of many possible factors which affect the complex systems characteristic of most of the world.

A second application of chaos-complexity is to view evil spiritual forces as a complex system. Previous scholarship has likely been operating within a Newtonian worldview, viewing demonology as a linear system and using rules that apply only to complicated systems, not complex ones. Thus there have been attempts to describe hierarchies of evil spirits. Recognizing that demons cannot be described with precise formulae explains the diversity of the biblical verses and the problems with classification attempts. Although not referencing chaos-complexity theory, some theologians have

intuited that evil forces are chaotic, disorganized, and destructive. Nigel Wright, for example, believes,

It is surely mistaken to conceive of the demonic realm as well organized and highly structured. Its essence is not reason but unreason, not organization but chaos.<sup>61</sup>

With Stewart we should question, are evil spiritual forces best modeled by a linear, deterministic system or a chaotic-complex one? I believe that the latter is the best model with which to understand demonology. Both biblical and scientific chaos are nonlinear, dynamic systems which are part ordered, part random, and contain multiple components that interact with each other.

Specific aspects of chaos-complexity can elucidate demonology. The idea that evil forces are self-similar may help explain the diversity, but interrelatedness, of biblical metaphors. For example, “legion” in the story of the Gerasene demoniac is a metaphorical term, meaning a large number; the “one” equaling the “many” can be explained by the fractals of chaos-complexity theory.<sup>62</sup> Demons, darkness, and chaos can be seen to be similar. Perhaps individual demons “nest” together to form darkness.

The concept of attractors and resistors can be helpful. The story of the “restless” demon who seeks to reside in a human “home” illustrates the concept of attractors; perhaps sin acts as an attractor (Matt. 12:43–45; Luke 11:24–26). This may explain many of the anecdotal reports of sin providing an “entry point” for demons. Yet an attractor is not a direct cause, as in a linear system. Perhaps demons of guilt cluster around a basin of guilt. Perhaps prayer and godly behavior could be viewed as a force of repulsion. This could have obvious implications for ministry; identifying attractors and resistors could be helpful. This idea may also satisfy Wink’s desire to maximize human responsibility: evil spiritual powers can cluster around sinful human organizations.

Attraction relates to the idea of boundedness, the tendency of complex systems to stay within basins of attraction. The biblical vagueness regarding the limitations on evil forces can be better understood by viewing this restriction as nonlinear and complex. Demons could have a large degree of freedom, but by nature (and God’s design), they tend to remain



within certain bounds. Their behavior is complex, but it is only a result of obedience to simple rules. They may stretch far but eventually are pulled back. Using chaos-complexity as a model for demonology can help reconcile the tension between determinism and free will: demons are not completely controlled by God, but they are limited by restrictions he places on them.

Finally, the notion of self-organization is helpful to demonology. Observations of demons “clustering” fits well with a chaos-complexity model. Perhaps the Pauline powers can be conceived of as self-organized demons. The apparent organization of evil spirits is not necessarily due to the fact that they are intelligent, willful, autonomous beings, but that they have the same tendency as other complex systems, to exist in a state of maximal stability. As a group, they can appear greater than the sum of their individual parts and can demonstrate swarm intelligence. In the story of the Gerasene demoniac, the behavior of the demons when in the herd of pigs can be explained by swarm behavior. Self-organization has implications for ministry, too. Perhaps both individual demons and the “super-organism” of evil need to be considered.

Chaos-complexity theory can elucidate the ontology of evil. Demons can be viewed as insects (well-studied complex systems): they lack individuality and intelligence, but nevertheless, they can self-organize into a powerful force. They may appear to be intelligent, but they are only exhibiting self-organizing behavior. The biblical description of demons as scorpions and locusts is apt. Self-organization confirms the maximizers contention that the demonic world is organized, but it does not support the notion of individual personalities. This theory may explain the tension between the apparent power of evil spirits and their limitations. It can also reconcile the ontological maximizers (evil forces can have real effects and appear organized) and minimizers (evil forces in reality are no more significant than insects). Viewing demonology as a chaotic-complex system may illuminate Barth’s confusing notion of “nothingness.” Chaos-complexity theory in some ways confirms that “nothingness is not nothing.” Demons have minimal ontology, but they can nevertheless exhibit powerful behavior when they cluster around a basin of sin.

Some aspects of chaos-complexity are difficult to apply to demonology. For example, there is no biblical suggestion that the number of demons is increasing at an exponential rate, which occurs in chaotic systems, or that their number is not fixed. This theory does not explain the relationship between Satan and the demons. Furthermore, in contrast to chaos-complexity theory, there is indication that the ancient world viewed spiritual beings in a linear manner. However, this view is not necessarily normative to the Bible, and there is evidence that regard for evil spirits was greatly reduced in both the Old and New Testaments.<sup>63</sup> Obviously, the ancient world would not have considered a contemporary scientific theory as a model for evil, but doing so can nonetheless assist our conceptualization of evil. All metaphors and models should be used cautiously and not over-extended.

## Conclusions

The difficulties and inconsistencies with respect to the literature on demonology discussed previously can be addressed and perhaps diminished, first, by recognizing the value of metaphor and, second, by recognizing the contributions of chaos-complexity theory. We need to acknowledge that metaphors and models are the primary, if not the only way to describe and discuss evil spirits. It is the main method used in the Bible and, I believe, should be the main method used in theology. Demonology is best discussed using metaphorical truth rather than propositional truth. By affirming the power of metaphors to depict reality, we can avoid unhelpful discussions about whether a term is “metaphorical” or “literal.” The linguistic contributions of metaphors and models can also further our understanding of demonology by providing incentive to search for appropriate models.

One such model which has proved helpful is chaos-complexity. Aspects of this theory such as nonlinearity, attractors, boundedness, and self-organization can provide a new perspective on demonology as well as offer a way to reconcile some of the apparent ambiguities in biblical studies and theology. Chaos-complexity theory fits well with biblical metaphors such as chaos, theological metaphors such as nothingness, and anecdotal descriptions of demonization. As metaphors cluster

# Article

## Chaos and Chaos-Complexity Theory

in the Bible, evil spirits can cluster around a basin of sin. "Broad" metaphors such as darkness and powers can be conceived of as a swarm of precise metaphors such as demons. Chaos, the biblical metaphor for evil, is also chaos, the scientific term for nonlinear dynamic systems. Evil forces are generally chaotic and disorganized with minimal ontology, but they can self-organize into powerful forces. They can be seen as "barely" real but can attain reality as they cluster or self-organize around basins of sin. Understanding evil forces as a complex system can help explain the diversity of both biblical metaphors and experiential reports. Although not all facets of chaos-complexity apply to demonology, chaos-complexity, along with metaphor theory, can provide a fresh perspective on this difficult but important subject, and may pave the way for further study, such as more specific applications to counseling and deliverance ministries. In addition, it may suggest other models which can be applied to demonology and deliverance. ☞

### Notes

- <sup>1</sup>This division is for convenience only; it is recognized that many scholars are more nuanced. A somewhat similar point has been made by Nigel Scotland who refers to "maximizers" as "expansives" and describes a second group as "moderates"; he does not discuss "minimizers" ("The Charismatic Devil: Demonology in Charismatic Christianity," in Peter G. Riddell and Beverly Smith Riddell, *Angels and Demons: Perspectives and Practice in Diverse Religious Traditions* [Nottingham: Apollos, 2007], 84–105). James M. Collins uses the term "enthusiasm" to describe contemporary deliverance practitioners (*Exorcism and Deliverance Ministry in the Twentieth Century: An Analysis of the Practice and Theology of Exorcism in Modern Western Christianity* [Colorado Springs, CO: Milton Keynes, 2009], 1, 2).
- <sup>2</sup>For example, Joel Marcus points out that "we should not look for too much consistency when dealing with things as ambivalent and protean as demonic spirits" (*Mark 1–8: A New Translation with Introduction and Commentary* by Joel Marcus [New York: Doubleday, 1999], 342).
- <sup>3</sup>Keith Ferdinando, "The Spiritual Realm in Traditional African Religion," in Riddell and Riddell, *Angels and Demons*, 21–41.
- <sup>4</sup>Based on a 1972 statement by the Bishop of Exeter. See, for example, Andrew Walker, "The Devil You Think You Know: Demonology and the Charismatic Movement," in Tom Smail, Andrew Walker, and Nigel Wright, *Charismatic Renewal: The Search for a Theology* (London: C. S. Lewis Centre/SPCK, 1993), 89.
- <sup>5</sup>See, for example, Frank Hammond and Ida Mae Hammond, *Pigs in the Parlor: The Practical Guide to Deliverance* (Kirkwood, MO: Impact Christian Books, 1973), 12.
- <sup>6</sup>Merrill F. Unger, *Biblical Demonology: A Study of the Spiritual Forces behind the Present World Unrest* (Wheaton, IL: Van Kampen Press, 1952), 52, 72.
- <sup>7</sup>*Ibid.*, 72–3.
- <sup>8</sup>*Ibid.*, 64–7. Similarly, popular author Neil Anderson concludes the following about the "personality of demons": they "can exist outside or inside humans," "they are able to travel at will," "they are able to communicate," "each one has a separate identity," "they are able to evaluate and make decisions," and "they are able to combine forces" (based on his understanding of Luke 11:24–26). Anderson, *The Bondage Breaker* (Eugene, OR: Harvest House, 1990), 102–5.
- <sup>9</sup>Charles H. Kraft, *Defeating Dark Angels: Breaking Demonic Oppression in the Believer's Life* (Ann Arbor, MI: Servant Press, 1992), 18–19. Fellow missiologist C. Peter Wagner has been vocal with respect to encouraging Christians to combat territorial spirits, the existence of which is extrapolated from "gods of the nations" and cosmic powers. Wagner, *Confronting the Powers: How the New Testament Church Experienced the Power of Strategic-Level Spiritual Warfare* (Ventura, CA: Regal Books, 1996). For a helpful critique of "territorial spirits," see René Holvast, *Spiritual Mapping in the United States and Argentina, 1989–2005: A Geography of Fear* (Leiden: Brill, 2008).
- <sup>10</sup>Michael Scanlan and Randall J. Cirner, *Deliverance from Evil Spirits* (Ann Arbor, MI: Servant Books, 1980), 84, also 96–7. Similarly David Brewer, in his discussion of demonology and psychiatry, describes different types of demons which tend to cluster in groups of six ("Jesus and the Psychiatrists," in Anthony N. S. Lane, *The Unseen World: Christian Reflections on Angels, Demons and the Heavenly Realm* [Grand Rapids, MI: Baker, 1996], 142–3).
- <sup>11</sup>Based on Mark 3:22. Bruce K. Waltke with Charles Yu, *An Old Testament Theology: An Exegetical, Canonical and Thematic Approach* (Grand Rapids, MI: Zondervan, 2007), 231.
- <sup>12</sup>Gregory A. Boyd, *God at War: The Bible and Spiritual Conflict* (Downers Grove, IL: IVP Academic, 1997), 194, also 182.
- <sup>13</sup>*Ibid.*, 141, 182, 186, 191, 199.
- <sup>14</sup>See, for example, Walker, "The Devil You Think You Know"; Robert J. Priest, Thomas Campbell, and Bradford A. Mullen, "Missiologistical Syncretism: The New Animistic Paradigm," in Edward Rommen, ed., *Spiritual Power and Missions: Raising the Issues* (Pasadena, CA: William Carey Library, 1995), 9–77.
- <sup>15</sup>Walter Wink, *Naming the Powers: The Language of Power in the New Testament* (Minneapolis, MN: Fortress Press, 1984); —, *Unmasking the Powers* (Minneapolis, MN: Fortress Press, 1986); —, *Engaging the Powers: Discernment and Resistance in a World of Domination* (Minneapolis, MN: Fortress Press, 1992).
- <sup>16</sup>Wink, *Naming the Powers*, 4.
- <sup>17</sup>Wink, *Unmasking the Powers*, 4. He views demons as the "real but invisible spirit of destructiveness and fragmentation that rends persons, communities and nations" (*Naming the Powers*, 107).
- <sup>18</sup>The German term, *das Nichtige*, implies nihil, null, or nonexistence. The editors chose "nothingness" with the proviso that its meaning is as explained by Karl Barth, *Church Dogmatics*, trans. G. W. Bromiley and R. J. Ehrlich (Edinburgh: T&T Clark, 1960), 3:289.

<sup>19</sup>Ibid., 352, 523.

<sup>20</sup>Ibid., 300, 307–8, 310. Barth does not explain how they arise from nothingness, but insists demons are not created.

<sup>21</sup>For example, Wolf Krötke claims it to be “an ontological impossibility” and an absurdity (*Sin and Nothingness in the Theology of Karl Barth*, 2nd ed., trans. Philip G. Ziegler and Christina-Maria Bammel, in *Studies in Reformed Theology and History* [Princeton, NJ: Princeton Theological Seminary, 2005], 39, 42, 48–51).

<sup>22</sup>The view of metaphor as cognitive was originated by I. A. Richards, *The Philosophy of Rhetoric* (New York: Oxford University Press, 1936), expanded upon by Max Black, *Models and Metaphors: Studies in Language and Philosophy* (Ithaca, NY: Cornell University Press, 1962), esp. 25–47, and applied to theology by Paul Ricoeur, *The Rule of Metaphor: Multi-disciplinary Studies of the Creation of Meaning in Language*, trans. Robert Czerny (Toronto: University of Toronto Press, 1977) and Janet Martin Soskice, *Metaphor and Religious Language* (New York: Oxford University Press, 1985), among others.

<sup>23</sup>The idea of conceptual metaphors was developed by George Lakoff and Mark Johnson (*Metaphors We Live By* [Chicago, IL: University of Chicago Press, 1980]) and has been very influential. They argue that metaphors are based on conceptual correspondence between ideas, not simply similarities. Metaphors are largely irreducible and non-translatable; they are neurological and not just linguistic, permeate thoughts and actions, and reflect our worldviews.

<sup>24</sup>Black, *Models and Metaphors*, 236.

<sup>25</sup>Ian G. Barbour, *Myths, Models and Paradigms* (London: SCM Press, 1974), 6.

<sup>26</sup>G. B. Caird, *The Language and Imagery of the Bible* (London: Duckworth, 1980), 16. Paul Ricoeur concurs that, especially in religion, metaphor has the power to define reality (*The Rule of Metaphor*, 215–56).

<sup>27</sup>Walter Brueggemann, *Theology of the Old Testament: Testimony, Dispute, Advocacy* (Minneapolis, MN: Fortress Press, 1997), 534.

<sup>28</sup>Clinton E. Arnold, *Powers of Darkness: Principalities and Powers in Paul's Letters* (Downers Grove, IL: IVP Academic, 1992), 218. Belial is used in the Second Temple Literature and assumed to be the same Beliar as used by Paul.

<sup>29</sup>Ibid., 54. Wink notes that the language of the powers is “imprecise, liquid, interchangeable and unsystematic.” He also recognizes the importance of figurative language in his claim that demons are “images whose reality can be experienced only at the imaginal level” (*Naming the Powers*, 9, 145).

<sup>30</sup>He believes that Satan should be viewed as “one manifestation of the Devil” and that the myth of the devil expresses profound truth (Jeffrey Burton Russell, *The Devil: Perceptions of Evil from Antiquity to Primitive Christianity* [Ithaca, NY: Cornell University, 1977], 3, 52, 252).

<sup>31</sup>Black, *Models and Metaphors*, 219–39.

<sup>32</sup>Barbour, *Myths, Models and Paradigms*, 30.

<sup>33</sup>The classic example being light as both particle and wave (Ibid., 75–7).

<sup>34</sup>Jack Cohen and Ian Stewart, *The Collapse of Chaos: Discovering Simplicity in a Complex World* (New York: Penguin Books, 1994), 19.

<sup>35</sup>Quantum physics points out that certain aspects of the universe (primarily the very small and the very large) function in terms of probabilities and uncertainty. The position and velocity of subatomic particles cannot be known simultaneously; they spin in a superimposed state with a 50% chance of being either up or down (the Heisenberg Uncertainty Principle), and the act of measurement affects the system. There are multiple potential interactions between subatomic particles and the forces between them. Nature is inherently random and unpredictable. See Cohen and Stewart, *Collapse of Chaos*, 44–45, 266; Peter Coles, *From Cosmos to Chaos: The Science of Unpredictability* (Oxford: Oxford University Press, 2006), 121–135; Dan Hooper, *Dark Cosmos: In Search of Our Universe's Missing Mass and Energy* (New York: HarperCollins, 2007), 43–58.

<sup>36</sup>Wolfhart Pannenberg, *Systematic Theology*, trans. Geoffrey W. Bromiley (Grand Rapids, MI: Eerdmans, 1994), 2:79–129. See also discussion and critique in Mark William Worthing, *God, Creation and Contemporary Physics* (Minneapolis, MN: Fortress Press, 1994), 117–23. Amos Yong also describes both the work of the Holy Spirit and evil spirits as force fields (*Discerning the Spirit(s): A Pentecostal-Charismatic Contribution to Christian Theology of Religions* [Sheffield: Sheffield Academic Press, 2000], 127). Neither elaborates on this idea.

<sup>37</sup>Robert John Russell, *Cosmology: From Alpha to Omega* (Minneapolis, MN: Fortress Press, 2008), 233; see also 226–41.

<sup>38</sup>Chaos-complexity theory evolved in diverse ways through different researchers and its origins can be traced to Henri Poincaré in the late nineteenth century. Some of the classic experiments include the pendulum (if there is just one, it obeys Newtonian laws, but if a second is attached, it exhibits chaotic behavior), dripping faucets (at first regular, then if the tap is opened more, irregular), and simple computations which diverge greatly if the decimal points are rounded off differently (calculators have different rules for rounding off). For a scientific textbook, see Massimo Cencini, Fabio Cecconi, and Angelo Vulpiani, *Chaos: From Simple Models to Complex Systems*, Series on Advances in Statistical Mechanics 17 (London: World Scientific Publishing, 2010); for lay-level accounts, see James Gleick, *Chaos: Making a New Science* (New York: Penguin Books, 1987); Cohen and Stewart, *The Collapse of Chaos*; Ian Stewart, *Does God Play Dice? The New Mathematics of Chaos*, 2nd ed. (New York: Penguin Books, 1997); John Gribbin, *Deep Simplicity* (New York: Random House, 2004); John Polkinghorne, *Exploring Reality* (New Haven, CT: Yale University, 2005), 7–37; Coles, *From Cosmos to Chaos*; Leonard Smith, *Chaos: A Very Short Introduction* (Oxford: Oxford University Press, 2007); Len Fisher, *The Perfect Swarm: The Science of Complexity in Everyday Life* (New York: Basic Books, 2009).

<sup>39</sup>Gribbin, *Deep Simplicity*, 255.

<sup>40</sup>Ibid., 143.

<sup>41</sup>The title of a paper Lorenz presented in 1972 was, “Does the flap of a butterfly's wing in Brazil set off a tornado in Texas?” Gribbin, *Deep Simplicity*, 60.

<sup>42</sup>Stewart, *Does God Play Dice?*, 368.

<sup>43</sup>Cohen and Stewart, *The Collapse of Chaos*, 23.

<sup>44</sup>A similar computer simulation describes three rules: avoidance (keep separate from each other), alignment (move in the average direction of the closest others), and



# Article

## Chaos and Chaos-Complexity Theory

attraction (or cohesion, move toward the average position of those closest). Known as Reynolds's boids, Fisher, *The Perfect Swarm*, 26.

<sup>45</sup>For example, N. Katherine Hayles, ed., *Chaos and Order: Complex Dynamics in Literature and Science* (Chicago, IL: University of Chicago Press, 1991).

<sup>46</sup>For example, Stuart A. Kauffman, *Reinventing the Sacred* (New York: Basic Books, 2008), 3; Cohen and Stewart, *The Collapse of Chaos*, 221.

<sup>47</sup>Cohen and Stewart, *The Collapse of Chaos*, 246.

<sup>48</sup>*Ibid.*, 400–1.

<sup>49</sup>Polkinghorne, *Exploring Reality*, 33.

<sup>50</sup>Stewart, *Does God Play Dice?*, 281.

<sup>51</sup>*Ibid.*, 376.

<sup>52</sup>Smith, *Chaos*, 15, 154–7.

<sup>53</sup>John Polkinghorne, *Quarks, Chaos and Christianity*, 2nd ed. (New York: Crossroad Publishing, 2005), 89.

<sup>54</sup>John C. Polkinghorne, *Science and Providence: God's Interaction with the World*, 2nd ed. (Philadelphia, PA: Templeton Foundation, 2005), 52.

<sup>55</sup>*Ibid.*, 62, 69–79; Polkinghorne, *Exploring Reality*, 136–46.

<sup>56</sup>Gregory A. Boyd, *Satan and the Problem of Evil* (Downers Grove, IL: IVP Academic, 2001), 151–8.

<sup>57</sup>*Ibid.*, 218–9.

<sup>58</sup>*Ibid.*, 282–4.

<sup>59</sup>Sjoerd L. Bonting, *Creation and Double Chaos: Science and Theology in Discussion* (Minneapolis, MN: Fortress Press, 2005), esp. 95–101.

<sup>60</sup>This is somewhat similar to Barth's claim that evil arises from chaos, except that Barth views chaos/nothingness as evil, not neutral.

<sup>61</sup>Nigel Goring Wright, *A Theology of the Dark Side: Putting the Power of Evil in Its Place* (Downers Grove, IL: IVP Academic, 2003), 116.

<sup>62</sup>Only named in Mark's (5:1–20) and Luke's (8:26–39) versions. The term is similar to "myriad" (Karel van der Toorn, Bob Becking, and Pieter van der Horst, eds., *Dictionary of Deities and Demons in the Bible* [Leiden: Brill, 1995], 507–8).

<sup>63</sup>The Old Testament seriously undermines and minimizes Ancient Near Eastern "gods": e.g., when the ark is captured, Dagon cannot survive in the presence of the Lord (1 Sam. 5:1–5); Elijah taunts his opposition, suggesting Baal is taking a trip or asleep (1 Kings 18:27); many "gods" are neutralized, e.g., the Canaanite god Yamm becomes the sea, Mot becomes death. Likewise, in the New Testament, compared with Greco-Roman culture, demons are not named and there are no elaborate exorcism rituals or prescription of amulets, also suggesting they are diminished in stature. See van der Toorn, Becking, and van der Horst, eds., *Dictionary of Deities and Demons*.

American Scientific Affiliation 67<sup>th</sup> Annual Meeting

## Science, Faith, and the Media: Communicating Beyond Books

Point Loma Nazarene University  
San Diego, CA  
July 20–23, 2012

*"Therefore each of you must put off falsehood and speak truthfully to his neighbor,  
for we are all members of one body." –Ephesians 4:25, NIV*

### CONFIRMED SYMPOSIA TOPICS

- Communicating Earth Science to the Public: Opportunities and Pitfalls
- Why Public Relations Matters—A PR Basic: Deliver the Message
- Personal Branding and Social Media
- Science, Religion and the Newsroom
- Christians and Science in Film
- Appropriate Technologies
- Genetics and Human Origins
- Information and the Origin of Life

ABSTRACT SUBMISSIONS ACCEPTED THROUGH JANUARY 31, 2012

More information at [www.asa3.org](http://www.asa3.org)