PERSPECTIVES on Science and Christian Faith

JOURNAL OF THE AMERICAN SCIENTIFIC AFFILIATION

In this issue . . .

"The fear of the Lord is the beginning of Wisdom."
Psalm 111:10

VOLUME 42, NUMBER 4

DECEMBER 1990

Perspectives on Science and Christian Faith

MANUSCRIPT GUIDELINES

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PERSPECTIVES ON SCIENCE AND CHRISTIAN FAITH
(ISSN 0892-2675) is published quarterly for $25 per year by the American Scientific Affiliation, 55 Market Street, Ipswich, MA 01938. Telephone (508) 356-5656. Second class postage paid at Ipswich, MA and at additional mailing offices.
POSTMASTER: Send address changes to: *Perspectives on Science and Christian Faith*, THE AMERICAN SCIENTIFIC AFFILIATION, P.O. Box 668, Ipswich, MA 01938.

Putting Things Into Perspective

The relationship between mind and brain—body and soul—are enduring questions. Today's discussion is weighted by efforts to use computer methodology to explain intelligence, efforts predicated on the assumption that 'matter is all.' William Dembski's article takes modern cognitive science to task for mixing science and philosophy. In contrasting current positions on intelligence with the 'historic Judeo-Christian' view, he warns of an emerging evangelical 'semi-materialist' position which "acknowledges the God of Scripture ... [but] ... denies that man's soul and spirit have an ontology distinct from the body."

* * * * *

David Moberg, no stranger to these pages, then brings the eye of the sociologist to the problem of hypocrisy in Christian communities. Moberg finds the root sources of hypocrisy to be founded in the expectations of society as well as in personal flaws which are "almost invariably not fully understood by even the acting person." He argues that a clearer understanding of hypocrisy will enhance "the total well-being or shalom of a genuine wholistic Christianity."

* * * * *

Not all biological thinking begins and ends with matter. David Cottingham finds that theoretical biologist Robert Rosen and theologian Jurgen Moltmann have independently developed the notion of 'anticipatory systems' in nature—an approach which smacks of teleology. The author folds these ideas together and suggests potential implications for our understanding of scripture and the most basic themes of Christianity.

The "Dialogue" heats up with differing views on the supplementary high school text *Of Pandas and People* and Richard Bube's earlier "Word Maze" piece on Reason and Faith. This issue offers the final column of Dick's series of trenchent and often provocative analyses of thorny words. Readers' letters and a goodly set of book reviews fill out this issue.

* * * * *

As the ASA enters its 50th year, we reaffirm our commitment to vigorously discuss the complex issues that confront the Christian in sciences. Some earlier questions have gone out of fashion, while others, especially in the human sciences, have come to the fore. We have a continuing mandate to act as a resource for the church and speak to society from an informed Christian world-view.

JWH

Converting Matter Into Mind: Alchemy and the Philosopher's Stone in Cognitive Science

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Cognitive science condones an unhealthy alliance between philosophy and science. The philosophy driving cognitive science is a materialism committed to explaining man via computation. To justify this philosophy the cognitive scientist writes computer programs that attempt to capture intelligent human behavior. Computers are not cheap, however. To justify sizable research grants, cognitive scientists often make promises they cannot keep. The result is a conflict of interest. Overstatement, sloppiness, and tendentious jargon come to blur the distinction between genuine scientific progress and spurious philosophy. This essay examines the scientific and philosophical merits of cognitive science in light of the historic Judeo-Christian position on mind and body.

In the *Foundations of Cognitive Science,* Herbert Simon and Craig Kaplan offer the following definition:

> Cognitive science is the study of intelligence and intelligent systems, with particular reference to intelligent behavior as computation.[1]

Since this definition hinges on the dual notions of intelligence and computation, it remains scientifically unobjectionable so long as one declines to prejudge the relation between computation and intelligence. As long as the cognitive scientist refuses to prejudge this relationship, his scientific programme assumes the following valid form: he considers presumed instances of intelligence in the world and seeks to model them computationally. This programme takes computation as a convenient paradigm for examining intelligence and then pushes the paradigm to as comprehensive an account of intelligence as the scientific data will allow. If a machine can be constructed which captures (or even extends) the full range of human intelligent behaviors, then the paradigm is fully successful. To the degree that machines fall short of this goal, to that extent the paradigm is unsuccessful, or has failed to realize its potential. Together with the foregoing definition, this approach to intelligence via computation puts cognitive science within the bounds of genuine science.

Now it is possible to prejudge the relation between intelligence and computation. Thus one can presuppose that computation comprehends all of intelligence. Alternatively, one can presuppose that intelligence can never be subsumed under computation. These assumptions have been and will continue to be the source for much fruitful discussion. Such a discussion will be interdisciplinary: to this discussion mathematical logic contributes recursion theory, physics prescribes limits on computational speed, philosophy lays out the mind-body problem, theology raises the question of immaterial souls and

spirits, etc. But while all these disciplines inform the debate over the respective boundaries of computation and intelligence, it must be realized that such a debate is primarily philosophical and thus independent of cognitive science qua science. If the director of Carnegie-Mellon's Robotics Institute, H. Moravec, is right when he predicts that in the next century robots will supersede the human race,[2] then this discussion will come to an end, being decided in favor of the view that computation subsumes intelligence. But for now Moravec is playing the prophet. Even this would not be reprehensible, if Moravec were wearing the prophet's mantle. Unfortunately he is wearing the scientist's lab coat, thereby conflating cognitive science qua science with a materialist philosophy of mind.

Cognitive science is legitimate science when it takes an unprejudiced view of the relation between computation and intelligence. Nevertheless, since cognitive scientists as a group are notorious for deciding the issue in advance, I shall henceforth refer to cognitive science qua science as the *science of cognition*.[3] Thus I shall use the phrase *cognitive science* pejoratively, implying that science and philosophy have been conflated because intelligence was prejudged as a form of computation. My view is that cognitive science stands to the science of cognition much as alchemy stood to chemistry. Certainly the alchemist's appeal to magic renders him more ridiculous to modern eyes than the cognitive scientist's appeal to a well-established materialist philosophy. But to my mind the cognitive scientist's conflation of philosophy and science is no less damaging to the science of cognition than the alchemist's conflation of magic and science was to chemistry. The fault of the cognitive scientist does not lie in his being simultaneously a philosopher and a scientist, but in not telling us when he is serving in which capacity. My purpose in this article is to untease that tangled web of philosophy and science which constitutes cognitive science.

The Parable of the Cube

In the *Foundations of Cognitive Science* Simon and Kaplan also offer the following account of artificial intelligence (AI):

> Artificial intelligence is concerned with programming computers to perform in ways that, if observed in human beings, would be regarded as intelligent.[4]

This account is scientifically unobjectionable and assigns to artificial intelligence the main practical business of cognitive science—programming computers to perform tasks thought to require intelligence in humans. Nevertheless, for the cognitive scientist who has prejudged the relation between intelligence and computation, the very phrase *artificial intelligence* becomes tendentious, implying that artificial intelligence has subsumed the whole of human intelligence. Thus cognitive scientists see no way of drawing a fundamental distinction between human and artificial intelligence—with strong emphasis on the word *fundamental*. The old degree-kind distinction is implicit here. Animal, human, computer, and indeed any finite discursive intelligence (to use a Kantian phrase) become from the point of view of cognitive science instantiations of algorithms. Eventually I shall return to these points. But for now I want to focus on two questions: (1) What is so special about computers that they should constitute the exclusive tool of AI? (2) Why should we expect AI to give us any insights about human intelligence? To answer these questions the idea of a sufficient cause for an intelligence becomes important. To appreciate this idea, we consider two stories, the first a yarn about an imaginary cube, which I call the Parable of the Cube; the second Thomas Huxley's bizarre tale of monkeys with typewriters.

Imagine you are given a box with one transparent side. Inside the box is a small black cube. Both box and cube are made out of plastic. The box is placed

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on a viewing stand with the transparent side facing you, much like a television. Now you watch. The cube moves around inside the box. Sometimes it is in this corner, sometimes in that. At other times it hangs in mid-air. Yet again it hurls itself against a side of the box. The sides are sturdy and do not break. What's more, the box has been soundproofed, so you cannot hear the little cube bouncing around. How exciting, you say. You are not convinced that the cube's entertainment will rival the television networks.

Behold, that little cube is communicating with you. And not just any old communication. The cube is reciting* Hamlet— *in Morse code.

Suppose next that the cube divides its time between the left and right side of the box. Back and forth it moves. For a time you are hypnotized. Your eyes glaze over. What a dull pastime. Gradually, however, you notice a pattern. You time how long the cube spends on the left. It's always one beat or three beats. Suddenly you remember your Morse code. Behold, that little cube is communicating with you. And not just any old communication. The cube is reciting *Hamlet*—in Morse code. But this is just the beginning. News, mysteries, stock predictions, and soap operas are all part of your newfound entertainment package. In the light of this discovery your television has become passé. Cube watching is now the rage in your household.

The story doesn't end here. Your neighbors start wondering why so much scratch paper is strewn around your home. Obviously you have been receiving coded messages and converting them to English. Soon the secret is out—you have an intelligent cube. People are in awe. They line up outside your doorstep to record the pearls of wisdom that are dropping from your cube's lips, so to speak. The cube has become more than entertainment. It has become a religious guru, expounding the mysteries of religious cubism. This is not simply a smart cube, this is a wise cube. Demand is such that you take the cube and its box on a speaking tour (well not quite; you know what I mean). The cube is hailed as the savior of mankind, its wisdom the uncreated light of the ineffable power. In the end all nations bow down and worship the cube.[5]

In line with the Parable of the Cube let us recall Thomas Huxley's simian typists.[6] Thomas Huxley was Charles Darwin's apologist. Darwin's theory of speciation by natural selection sought at all costs to avoid teleology. The appeal of Darwinism was never, That's the way God did it. The appeal was always, That's the way nature did it without God.[7] Thus one looked to chance, not intelligence, to render Darwinism plausible. Huxley's simians were to provide one such plausibility argument. Huxley claimed that some huge number of monkeys typing away on typewriters would eventually (where "eventually" was a very long time) type the works of Shakespeare. If one assumes the monkeys are typing randomly, not favoring any keys, and not letting one key stroke influence another, Huxley's claim is a simple consequence of a fundamental theorem in probability known as the Strong Law of Large Numbers.[8] Indeed, given enough time one can expect the monkeys to type all the great works of literature, though the bulk of their output will be garbage.

The appeal of Darwinism was never, That's the way God did it. The appeal was always, That's the way nature did it without God.

Even with trillions of monkeys typing at blinding speeds over a time span comprising many lifetimes of the known universe, the probability of randomly typing *Hamlet* is still vanishingly small. Thus it is arguable whether Huxley's apologetic for Darwinism was in any way cogent on probabilistic grounds. But the question that is too frequently glossed is, What determines whether the monkeys have finally typed *Hamlet*? The monkeys are assumed unintelligent. Hence they cannot stop and deliver a copy of *Hamlet* when after aeons it finally appears. No. Some intelligent being must examine all the monkeys' output, wade through all the garbage, all the false starts of *Hamlet*, until finally this intelligence comes across a finished copy of *Hamlet*. Now it does no good to claim all that is needed is a simple computer program which has a stored copy of *Hamlet* and compares the monkeys' output with the copy. This merely begs more questions—What intelligence wrote the program? What intelligence installed a copy of *Hamlet* in the computer's memory? Where did the intelligence get the copy of *Hamlet* in the first place?

Humans naturally see meaning and purpose in a work of literature like *Hamlet*, just as they see

meaning and purpose in the organisms of nature. What Huxley hoped to show was that such meaning and purpose, Aristotle's teleology and final causes, were in fact illusory. Intelligence was not in any way prior to the random processes of nature. Rather, intelligence was itself a product of nature's randomness, constructing meaning and purpose after the fact. Still, the critical question remains, What intelligence decides whether the monkeys have finally typed *Hamlet?* Without an intelligence to interpret the monkeys' output and distinguish the intelligible from the inane, the monkeys will type indefinitely, with one output as inconsequential as the next. Let me put it this way. Huxley's example presupposes an intelligence familiar with the works of Shakespeare. At the same time Huxley wants to demonstrate that random processes, the typing of monkeys, can account for the works of Shakespeare. Thus Huxley's example is supposed to show that the *works* of Shakespeare can be accounted for apart from the *person* of Shakespeare. Huxley wants it both ways. An intelligence must be on hand to know when the monkeys have typed *Hamlet*, and yet *Hamlet* is to stand in need of no author. This is known as having your cake and eating it. Polite society frowns on such obvious bad taste.

It's no surprise that the humanities have a hard time with rabid AI propagandists. Beethoven would not have suffered being told his Ninth Symphony was possible without him. Given Beethoven's high opinion of himself, I am confident of this assertion. As for Shakespeare being told *Hamlet* could make do without him, I'm not sure whether his reaction would have been displeasure or amusement. True artists know that their work is not reducible to any other categories, least of all chance.

Can we find a physical system which simultaneously expresses intelligence and provides an adequate causal account for this intelligence? The obvious place to look is the human body, and specifically the brain.

Let us now return to the Parable of the Cube. The cube signals intelligent messages in Morse code. Is the cube's signaling spontaneous or does an extrinsic intelligence guide it? Since both the cube and the box are plastic, and since plastic has to date indicated a marked absence of intelligent behavior, we are apt to conclude that the intelligence is extrinsic. Again we infer an intelligence. We do not consider the cube a sufficient cause for the signaling of *Hamlet*, just as the typing of monkeys is an insufficient cause for *Hamlet*. In both cases we have physical systems which express intelligence, but which fail to supply an adequate causal account of the intelligence they express. Can we find a physical system which simultaneously expresses intelligence and provides an adequate causal account for this intelligence? The obvious place to look is the human body, and specifically the brain.

Nerves and Brains

Cubes in boxes and Huxley's simians are examples of physical systems which insofar as they express intelligence fail to account for intelligence. In what way then does the physical system constituting the human brain differ? Why do people attribute thought and intelligence to the matter constituting their brains? Certainly there is a causal connection between brain and behavior. Certainly there is a link between brain and intelligence—lobotomy victims have yet to obtain membership in the National Academy of Sciences. Closer to the truth, however, is the philosophical materialism that permeates today's intellectual climate. With it comes a commitment to explain human intelligence strictly in terms of the human physical system. Given the indisputable connection between brain-states and behavior, the materialist has a facile answer to the mind-body problem: mind=brain.

Philosophical materialism has, despite the advent of quantum mechanics, yet to part with its predilection for mechanistic explanations. Given this preference, it construes causality strictly in terms of physical interactions. Thus it sees only two possible resolutions of the mind-body problem: (1) The substance dualism of Descartes, i.e., the human body is a machine controlled by an immaterial spirit, much as a pilot drives his vehicle; (2) The monism of Spinoza, i.e., the human body is the whole human. Cartesian dualism is problematic not merely because its ontology includes immaterial souls and spirits, but also because it splinters the human person, assigning to the body a negligible role on the question of intelligence. Confronted with this position modern philosophers choose rather to dispense with immaterial souls and spirits altogether. In this vein the French Enlightenment thinker Pierre Cabanis (1757-1808) offered his famous dictum, *Les nerfs—voilà tout l'homme* (nerves, that's all there is to man).

Nevertheless, a third option exists. This is the historic Judeo-Christian position on mind and body: the human being *unites* physical body and immaterial spirit into a living soul for which the separation of body and spirit is unnatural (in times past this separation was called death).[9] We are to think of a union, not of a Cartesian driver operating his vehicle. I won't defend the historic position just yet, but I must emphasize the obvious: *this position demands an expanded ontology*. Matter by itself, notwithstanding how well it is dressed up with talk of holism, emergence, or supervenience, notwithstanding with what complexity it is organized, is still matter and cannot be transmuted into spirit. I stress this point because many theistic scientists in the name of scientific respectability have reinterpreted the historic position in such a way that spirit becomes an emergent property of the complex physical system constituting the human body. While this reinterpretation deserves attention, it is not the historic position, and it is misleading to attribute it to the theologians of past centuries, or naively to think that had these theologians lived today, they would have eliminated immaterial spirits in favor of a complex systems approach. The historic Judeo-Christian position is inconsistent with both Cartesian dualism and Spinozist monism. The mechanism implicit in these latter views leaves no room for matter and spirit to interact coherently within a single reality. I raise these points now to lay my cards on the table. I shall return to them later.

Matter by itself, notwithstanding how well it is dressed up with talk of holism, emergence, or supervenience, notwithstanding with what complexity it is organized, is still matter and cannot be transmuted into spirit.

Cabanis' statement merits a second look. Suppose that autopsies of human beings reveal that their crania are packed with nothing but cotton wadding. Let us assume that in all other ways reality remains unchanged. Thus the great works of literature abound, music flourishes, and science advances. In particular, men are conscious of thinking as before, only now they are aware that their brains are hopelessly inadequate to account for their intelligence, just as a cube in a box is inadequate to account for intelligence. Thus we would have to look elsewhere, perhaps to an immaterial spirit, to account for intelligence. In this way Cabanis would be refuted.[10]

But the brain is clearly not composed of cotton wadding, nor of any material exhibiting comparable simplicity. So why is there any reason to hope that the brain can account for intelligence? The answer is found in the following panegyric to the brain, a literary form common in neuro-physiology texts:

> The human cerebral cortex contains something like 10^{10} to 10^{14} nerve cells. With that astronomical number of basic units, the cerebral cortex is sometimes referred to as the "great analyzer." If there are a minimum of 10^{10} nerve cells in the cerebral cortex, that number, 10 billion, is about 2.5 times the human population of the earth. Imagine three planets with the same population as the earth, with telegraph and radio links between every group of people on those planets. With that in mind, one begins to envision the type of situation present in the brain of each individual.
>
> That is only a start, however. Each nerve cell makes contact with sone 5,000 or so other nerve cells; that is, each nerve cell has up to 5,000 junctions with neighboring nerve cells, some as many as 50,000 junctions. At those *synaptic junctions* or *synapses*, information is passed between the nerve cells. What is significant about that process is that the information may be modified during its transfer. The number of sites at which information may be altered in some way is, therefore, astronomical, since the number of synaptic junctions within just a gram of brain tissue is of the order of 4×10^{11}. The brain's cellular organization shows an almost unbelievable profusion of *connections* between nerve cells. Without such intricate connectivity, learning processes would be impossible.[11]

The brain is considered an adequate explanation for mind and intelligence because of its vast complexity and intricate organization. By being complicated enough, by comprising billions of interrelated components, the brain is supposed to render thought possible.

And here we come to a rub. Precisely because of its vast complexity, no one really knows what is going on in the brain. More precisely, the connection between brain-states and intelligence is a matter of ignorance. This is not to say there is no causal relation between brain and behavior. There is if one looks at isolated, discrete behaviors. But as soon as one moves to the level of goals, intentions, and what philosophers more generally call propositional attitudes, cognitive scientists abandon hope of understanding this higher level through the lower neurological level. Hence they take refuge in notions like *supervenience*, *emergence*, and the now passé *epiphenomenon*. Thus cognition supervenes on neural activity, which in turn supervenes on the underly-

ing physics; alternatively, intelligence emerges out of neural activity, which in turn emerges out of the underlying physical configuration; and consciousness is an epiphenomenon of neural activity.

Those who subscribe to the historic Judeo-Christian position on mind and body are often taken to task for believing that humans possess immaterial spirits. By believing this, they are considered disingenuous, taking refuge in ignorance. Spinoza, for instance, castigates those "who will not cease from asking the causes of causes, until at last you fly to the will of God, the refuge for ignorance."[12] Nevertheless, if the historic position is correct, then those who subscribe to it are by no means ignorant. By looking to immaterial spirits and a transcendent God, they are in fact drawing proper causal connections—if they are right. But regardless whether materialists are right in affirming the brain is a sufficient reason for intelligence, their ignorance of the precise causal connection between brain and intelligence remains. Granted, it is an ignorance they hope to dispel through research. But it is a hope they have largely abandoned, just because the complexities are so overwhelming.[13]

"It remains sadly true that most of our present understanding of mind would remain as valid and useful if, for all we know, the cranium were stuffed with cotton wadding."

Thus while the commitment to materialism persists, the hope of explaining human intelligence at the neural level, which for the materialist is the logical level, is not a serious consideration. Karl Lashley will for instance say, when addressing a symposium on the brain-mind relationship, that "our common meeting ground is the faith to which we all subscribe, I believe, that the phenomena of behavior and mind are ultimately describable in concepts of the mathematical and physical sciences." Yet towards the end of his career he will remark, "whether the mind-body relation is regarded as a genuine metaphisical issue or a systematized delusion, it remains a problem for the psychologist (and for the neurologist when he deals with human problems) as it is not for the physicist.... How can the brain, as a physico-chemical system perceive or know anything; or develop the delusion that it does so?" And even though R. W. Gerard's observation is over forty years old, current brain research has yet to remove its sting: "It remains sadly true that most of our present understanding of mind would remain as valid and useful if, for all we know, the cranium were stuffed with cotton wadding."[14]

Brain complexity is not the only problem facing the neurologist, who with Lashley's materialist convictions seeks to connect brain with intelligence. Brains are not uniform. One brain is not isomorphic to the next. While general morphology and structures coincide, brains from one individual to the next differ so much at the neurological qua synaptic level, that a search for common higher-level cognitive correlates holding across brains becomes a task so daunting as to seem hopeless. Even when dealing with a lone brain, it is clear that the same higher-level cognitive behavior has incalculably many distinct neurological antecedents. For example, a multitude of brain-states will induce the same cognitive act (e.g., dialing 911 in case of an emergency). Bioethics enters the picture as well, since brain research entails messing with people's brains in a very real sense. Barring a Nazi regime, unrestricted brain research on humans is not practicable. Finally, much like in quantum mechanics the observer tends to disturb the object being observed, so too brain research is invasive and cannot avoid confounding.

Clean Brains

Enter the clean world of computers. For the way out of this impasse cognitive scientists look to computer science and artificial intelligence. Computers are neat and precise. Unlike brains for which identical copies cannot be mass-produced, computers and their programs can be copied at will. Inasmuch as science thrives on replicability and control, AI offers tremendous practical advantages over neurological research.

Now the obvious question is, How well can computers model the brain? While this is the obvious question, it is not the question that really interests cognitive scientists. The reason is clear. As good materialists we believe that cognition is grounded in neural states. But it is cognition that interests us, not neural states. Moreover, we don't have the slightest idea how neural states correlate with cognition. Thus to simulate with computer programs brain-states of which we have no idea how these relate to cognition is simply to raise more problems than are solved. Simulating brain-states will not throw any light on cognition. This is largely a

theoretical consideration.[15] Practically speaking, to model a human brain at the synaptic level is beyond the memory/size capabilities of present machines.

What are cognitive scientists to do? How can they justify the claim that computation provides a sufficient cause for intelligence? Rather than simulate brains, cognitive scientists write computer programs which simulate behaviors typically regarded as requiring intelligence. Thus they bypass the neural level and move directly to the highest cognitive levels: perception, language, problem solving, concept formation, and intentions. Instead of modeling the brain, cognitive scientists model the intelligent behaviors exhibited through those brains. Thus many man-years of programming have been spent developing language translators (unsuccessful), chess playing programs (successful), expert systems (successful to varying degrees), etc. On balance it is fair to say that from the technological side AI has been and will continue to be successful. Nevertheless, as a comprehensive approach to human intelligence, its results have been less impressive. This is not for any lack of ingenuity on the part of computer programmers—some are very clever indeed. But intelligence involves much more than clever programs which are adept at isolated tasks. What goes by the name of AI has only delivered programs with very narrow competence.[16]

Rather than simulate brains, cognitive scientists write computer programs which simulate behaviors typically regarded as requiring intelligence.

Confident that this will change, cognitive scientists adopt the following rationale. If through concrete computer programs (algorithms) they can simulate all important aspects of human intelligence within a complete information-processing package, then they will have proved their case that human intelligence is a species of artificial intelligence. To realize that this view is not all that extreme among cognitive scientists, consider the following comments by Zenon Pylyshyn, professor of psychology and computer science, and director of the Centre for Cognitive Science at the University of Western Ontario. He is regarded as a thoughtful, sober figure in the cognitive science community (as compared to his more propagandistic colleagues):

> I want to maintain that computation is a literal model *[nota bene]* of mental activity, not a simulation of behavior, as was sometimes claimed in the early years of cognitive modeling. Unlike the case of simulating, say, a chemical process or a traffic flow, I do not claim merely that the model generates a sequence of predictions of behavior, but rather that it does so in essentially the same way or by virtue of the same functional mechanisms (not, of course, the same biological mechanisms) and in virtue of having something that corresponds to the same thoughts or cognitive states as those which govern the behavior of the organisms being modeled. Being the same thought entails having the same semantic content (that is, identical thoughts have identical semantic contents).[17]

> As dyed-in-the-wool realists, we propose ... exactly what solid-state physicists do when they find that postulating certain unobservables provides a coherent account of a set of phenomena: we conclude that the [programs] are "psychologically real," that the brain is the kind of system that processes such [programs] and that the [programs] do in fact have a semantic content.[18]

Several comments are in order. Pylyshyn clearly accepts that computation encompasses thought and intelligence. His characterization of cognitive science is, at least in its enunciation, bolder than mine. For he claims that computation is a "literal model" of mental activity, and in effect repudiates mere "simulation." I consider this distinction spurious since cognitive science has progressed nowhere near the place where it can legitimately make such distinctions. Still, his comments reveal the climate of opinion. His reference in both passages to semantic content is significant, because meaning is the weak underbelly of AI. As we saw with Huxley's simians, the meaning of *Hamlet* was extrinsic to the monkeys' typing. Yet Pylyshyn claims that meaning (semantic content) will be intrinsic to the computer's computation.

I therefore reject all arguments that extrapolate from good chess playing programs or good medical diagnostic programs to the claim that computers can think...

Unlike Pylyshyn who claims that computation is a literal model of mental activity, I shall be content to admit that cognitive scientists have proved their case if they offer convincing arguments that machines can simulate the totality of intelligent human behavior in a comprehensive package (not merely a vast assortment of behaviors in isolation). By simulation I mean nothing less than an exhaustive imitation of behaviors requisite for intelligence. I therefore reject all arguments that extrapolate from

good chess playing programs or good medical diagnostic programs to the claim that computers can think, have intelligence, display cognitive abilities, evince mentality, etc. Such talk is an abuse of language. I want to see a machine that puts it all together, integrating all those isolated tasks that require intelligence into a comprehensive whole.

Finite Man

I am urging cognitive scientists to fabricate a machine which grasps the whole that is human intelligence. Having made this challenge, I must add a restriction: in maintaining that machine intelligence subsumes human intelligence, cognitive scientists must be limited to machines that are physically possible. There is a vast difference between machines that can be physically realized and machines that exist only in the never-never land of abstraction. This never-never land of abstraction is known to mathematicians as the set of *partial recursive functions*. These functions constitute the maximal collection of computable objects. The branch of mathematics known as recursion theory studies these partial recursive functions and provides the theoretical underpinnings for computer science. Now any real computer running a real program has a limited amount of time and memory with which to complete its computations. Real computers are constrained by limited resources. Abstract computers, the partial recursive functions, suffer no such constraint.[19]

Since the partial recursive functions contain everything that is computable, it follows that any real computer is just an abstract computer in disguise. The converse, however, does not hold. For instance, a computation that requires 10^{1000} additions and multiplications is beyond the capability of any machine which can be fit into the known universe. Given the size of the universe (under 10^{80} elementary particles), a duration of many billions of years, the maximum speed of information-flow (the speed of light), and the smallest level at which information can be reliably stored (certainly no smaller than the atomic level), no such computation can be realized. On the other hand, such a computation is readily accomplished by some partial recursive function. Implicit here is the question of computational complexity, a facet of computer science which today is playing an increasingly dominant role.[20]

Now this distinction between physically realizable and abstract machines becomes important when we consider the intrinsic finiteness of human behavior. It is common to claim that humans are finite beings. This can be argued. Scripture, for example, indicates that humans are made in the image of an infinite God. Pascal writes, "by space the universe encompasses and swallows me up like an atom; [but] by thought I comprehend the world."[21] Yet regardless of what we believe about man's finiteness generally, man's behaviors are finite. And this is the point of departure for the sciences of man. Science cannot deal with, to use Kant's terminology, noumenal man; it can only deal with phenomenal man. Desiring a monopoly on human intelligence, cognitive scientists are quick to presuppose that phenomenal man is the whole man. Phenomenal man is the man we can observe, the man known through his behaviors. Granted, this is the only man scientists can deal with. But is phenomenal man the whole man?

Phenomenal man is the man we can observe, the man known through his behaviors. Granted, this is the only man scientists can deal with. But is phenomenal man the whole man?

Let us be clear that human behavior and sensory experience are intrinsically finite. One can understand the finiteness of human behavior on many levels. At the atomic level man is a finite bundle of atoms: reconstruct an individual atom by atom, giving the atoms proper relative positions and momenta, and you have a perfect clone. This construction is of course utterly infeasible; moreover, quantum effects may render it theoretically impossible. An equally infeasible finite reconstruction of the human organism which, however, has a better chance of avoiding quantum indeterminacy can be made at the chemico-molecular level (cf. molecular biology and biochemistry).

At the other extreme one can argue that since language can fully describe human behavior, and since language is intrinsically finite (there are only so many words to choose from, any sentence is of finite length, only so many sentences can be uttered in any lifetime), it therefore follows that human behavior is intrinsically finite. Another argument for the finiteness of human behavior can be made from the way human sensibilia can be encoded. Compact discs can for instance store audio (e.g., music) and visual (e.g., photographs) experience suitably

encoded as a finite, discrete string of information, which when properly decoded can be played back with an arbitrary degree of resolution.

The level at which I prefer to understand the finiteness of human behavior is neurological.[22] This approach is in line with the earlier quote by Pierre Cabanis, *Les nerfs—viola tout l'homme.* At this level behavior and experience result from the firing of a finite number of nerve cells which can fire only so many times a second. Continuity of experience is therefore a myth. Experience is fundamentally discrete. It is because the number of neurons and their rate of firing is finite that we experience the digitally encoded sound off compact discs as music rather than a shower of staccatos. For the same reason we experience a movie as continuous action rather than a discrete set of frames.

Let us for the moment play along with Cabanis, reducing man to his neurology. At this level of analysis not only do human behavior and sensory experience become finite, but also the total number of possible human beings becomes finite. The following loose combinatorial analysis argues the point.[23] Let n be an upper bound on the number of neurons in any human, f an upper bound on their firing rate (i.e. number of firings a neuron is capable of per second), and l the maximum life span of any human (in seconds). Then during any firing interval there are 2^n possible ways the n neurons can fire, and over a maximal life span there are $(2^n)^{fl} = 2^{nfl}$ possible ways the n neurons can fire in succession (let us call such successions of neural firings *behavioral sequences*). If one assumes that man equals phenomenal man, then 2^{nfl} possible behavioral sequences include all conceivable human lives. A fortiori, there are at most that many human beings, for human beings with exactly the same behaviors and experiences are identical (we assume materialism of course).

But the conclusion remains that all human behavior finds its immediate, efficient cause at the neurological level. And at this level behavior is finite.

The number 2^{nfl} is huge, even for modest n, f, and l. Thus with billions of people, even billions of universes, we should not expect to see two human lives approximating each other, much less repeated. Often the vast complexity of human behavior exhibited in such huge numbers is taken to justify the reduction of humans to neural firing sequences, as though complexity and organization in themselves provide a sufficient reason for intelligence. We have noted that this reduction gets sidestepped by introducing terms like *supervenience* and *emergence,* which are supposed to distinguish higher level "intelligent" behavior from its physiological underpinnings. But the conclusion remains that all human behavior finds its immediate, efficient cause at the neurological level. And at this level behavior is finite.

Certainly this approach to Frank is solipsistic. Frank is his neural firings, and it doesn't matter a bit what the world is doing.

The procedure for specifying 2^{nfl} as an upper bound for behavioral sequences could stand some refinements. Instead of choosing n to enumerate an individual's neurons, one might have chosen n to enumerate the synaptic interconnections at which neurotransmitter is released, thus increasing n by a few orders of magnitude. I have implicitly assumed that neurons neither are born nor die, and that interconnections between neurons are stable. Again this is an artificial assumption. But anyone who challenges it need only increase n to include all those neurons which will be born or die as well as all potential interconnections, restricting at any given time attention to those neurons and interconnections that are currently active. I have also implicitly assumed that neural firing is limited to discrete intervals: a behavioral sequence proceeds in discrete time intervals wherein each neuron either fires or fails to fire. Lags between firings of distinct neurons are therefore ignored—this becomes not unreasonable if the firing intervals are made sufficiently brief. Thus to justify the assumption of synchronous firing among neurons the firing rate f may also need to be increased. Suffice it to say, there is an upper bound (however crude) on all the behavioral sequences that can conceivably constitute phenomenal man.

Consider now an individual named Frank who comprises n neurons, and let F be the collection of Frank's n neurons. Define a *behavioral instant* in Frank's life as an n-tuple $(B_\alpha : \alpha \in F)$ where for each neuron α, B_α indicates whether neuron α fired during that interval (more precisely, B_α is a boolean variable taking the value 0 or 1 depending on whether neuron α fails to fire or fires, respective-

ly). Frank's life (behavioral sequence) then consists of the *behavioral process* $B(\alpha,t)$ where t is a discrete time variable ($f=10^3$ is an upper bound on the firing rate of neurons; thus we can take t as multiples of 10^{-3}). Certainly this approach to Frank is solipsistic. Frank *is* his neural firings, and it doesn't matter a bit what the world is doing. Of course, we assume that the world is impinging on Frank and therefore affecting his B_α's over time. But this is irrelevant to our analysis.

Finally, if we assume that Franks' life is bounded by l seconds, then Frank's actual life is at most one of 2^{nfl} possible lives he might have lived. Moreover, it follows from elementary combinatorics that Frank's whole life can be encoded in a string of 0's and 1's of length nfl, e.g.,

$$S_{Frank} = 1000101101 \ldots 10,$$

where the ellipsis represents nfl minus 12 digits (12 being the number of digits actually displayed). *This is your life, Frank.* If we choose n, f, and l big enough, then such sequences of length nfl can encode all human lives. In particular, there is a base 2 number of length nfl that encodes me—even my yet unlived future, even the writing of this essay. This number is of course just S_{Bill}.

In particular, there is a base 2 number of length nfl that encodes me—even my yet unlived future, even the writing of this essay. This number is of course just S_{Bill}.

Our analysis of Frank is a classic example of a brain in a vat. The brain receives stimuli and emits responses. These stimuli and responses occur over time and can be arranged in sequence. The string S_{Frank} captures that sequence. It is important to note that strings like S_{Frank}, S_{Bill}, S_{Jane}, and S_{Susan} are assigned according to a rationale. By encoding experience and behavior, these strings capture the life of an individual. If one accepts that God's final judgment of humanity is according to the deeds done in the body,[24] then such sequences are sufficient evidence for God to reach a verdict. These numbers are not assigned in the way telephone numbers or social security numbers are assigned. There the only requirement is that the number have so many digits and be unique to the individual. The rationale for S_{Frank} goes much deeper. It captures Frank's life.

The Dilemma of Humanism

Phenomenal man is computational man. Computational man, however, has yet to be computed on an IBM or Cray computer. Currently, computational man exists solely in some abstract machine from the realm of partial recursive functions. Leaving the point which concerns the cognitive scientists for the moment aside, namely, how human intelligence is circumscribed by physically realizable machines, let us consider how the reduction of phenomenal man even to abstract machines threatens the humanist, who on the one hand thinks man is wonderful, and on the other, staunchly retains a philosophical materialism. I find the humanist's assumptions inconsistent. If his philosophical materialism is correct, then there is nothing about man to transcend the constitution and dynamics of his physical system, the human body. Thus humanist man is, in the end, just phenomenal man. And this man, as we have demonstrated, is just computational man. Now the inconsistency lies in the fact that computational man is not all that wonderful, as humanists readily admit.

Thus when humanists like Hubert Dreyfus, Joseph Weizenbaum, and Theodore Roszak declaim against the dehumanization fostered by too high a view of machines and too low a view of human mentality, they inevitably sidestep the question whether some big enough abstract machine can capture the human being.[25] They refuse to admit that unless man in some way transcends matter, the reduction of man to machine is indeed valid. Humanists attribute to man dignity and worth. Humanists look at man as the end of all man's longings. Man is ultimate. Thus any talk of transcendence is deemed a projection of impulses already present in man. But when humanists limit their attention to man as a product of the material universe, and refuse to acknowledge transcendence in man, or better yet, a transcendent creator who has made man in his image, they bare their necks to their cognitive-scientist opponents. For despite the rhapsodic flights and poetic rapture wherewith humanists celebrate the grandeur of man, man the product of nature, man the physical system is mechanical man.

The humanist wants to believe that humans possess a certain something computers do not, that the computer cannot vitiate his exalted view of humanity. Nonsense. If his materialism is correct, then humans can be trivially realized as abstract machines, i.e., partial recursive functions in some programming framework. Such a reduction to even wildly complex abstract machines renders the things

he holds dear—dignity, freedom, and value—null and void. I don't think I've overstated the case. An atomistic view of intelligence is ruinous to any exalted view of man. This is evident from our solipsistic analysis of Frank. On materialist assumptions all of Frank is encompassed in $\mathbf{S}_{\text{Frank}}$. Behavioral sequences can even accommodate contingency. Thus $\mathbf{S}_{\text{Frank}'}$ is Frank's life if he had gotten that promotion, $\mathbf{S}_{\text{Frank}''}$ is Frank's life if he had not been dropped on his head as a baby, etc. When we consider all possible behavioral sequences for Frank—sequences constrained only by his genetic makeup and possible experiences—we arrive at a set $\{\mathbf{S}_{\text{Frank}}, \mathbf{S}_{\text{Frank}'}, \mathbf{S}_{\text{Frank}''}, \ldots\}$, where the ellipsis is finite. Frank's intelligence is entirely encompassed in this finite set.[26]

Behavioral sequences can even accommodate contingency. Thus $\mathbf{S}_{\text{Frank}'}$ is Frank's life if he had gotten that promotion, $\mathbf{S}_{\text{Frank}''}$ is Frank's life if he had not been dropped on his head as a baby, etc.

Now a trivial consequence of recursion theory is that all relations on finite sets are computable.[27] Thus under materialist assumptions, whatever one may mean by Frank's intelligence can be encompassed within the framework of computer science. Whatever Hubert Dreyfus meant by his title, *What Computers Can't Do*, unless he is willing to look beyond the matter which constitutes the human body, he cannot legitimately mean that humans can display intelligence inaccessible to machines. In fact, one of his primary points is that computers must fall short of humans because they cannot possess a human body. But this is really a minor point, since it is not the body that is at issue, but the experience of that body, and this experience can be adequately realized in some coding scheme, like the one we indicated for Frank.

Finiteness really shatters the humanist dream. My aim here has been to force the humanist to own up to the unpleasant implications of a philosophical materialism to which he so often subscribes. Most people, I am afraid, do not realize the full import of the revolution that is mathematical recursion theory, or in its applied form, computer science. *Computers are the ultimate machines.* Church's Thesis, a guidepost in computer science, guarantees that computers are the *ne plus ultra* of machines.[28] Every machine, much like Frank's behavior and experience, can be discretized. Once discretized, it can be simulated on a finite state computer. This is a point that can be justified at length, but let me instead direct the reader's attention to an example which should make the claim plausible. Aircraft companies routinely use supercomputers to simulate the flow of air over wing designs. This method for evaluating designs is reliable, successful, and tidy. In the process, reality is encoded computationally and simulated. Given sufficient resolution of the computational representation, the simulation is so fine that if reality could be reconstructed from the simulation, it would be indistinguishable from the original reality.

Church's thesis, which is unanimously confirmed by over 50 years of theoretical and practical experience in mathematics and computer science, indicates that what any machine can do, a computer can do.[29] Thus it does no good to hope that the brain may turn out to be a better machine—a better "something" if "machine" is unpalatable—than a computer. Anyone who offers such alternatives simply does not know his computer science, or his neuro-physiology, or both. The brain only has so many neurons, each of which has only so many synaptic interconnections; these neurons have a maximal rate of firing and are subject to threshold effects—there are no unlimited degrees of firing. Once one has a finite state object, its dynamics are fully representable on a computer (maybe not on a computer we can realize with the usual integrated circuits, but certainly on an abstract machine). The brain is such an object. On materialist assumptions it is illegitimate to reject a computational model of mentality. Once, however, one admits computation as encompassing intelligence, it becomes illegitimate to ascribe to intelligence and humanity honors it can deserve only by not being a machine, honors like dignity and freedom.

The Problem of Supervenience and Personal Identity

I have been assuming that the humanist is dissatisfied with the idea of man being a machine. Let us now suppose he accepts my account of phenomenal man as an abstract machine. Let us say that on his materialist assumptions he is driven to the conclusion that man is a computational machine, albeit a very complex, highly organized computational machine. He will want to retain the things he holds dear, like dignity and freedom, but he will now have to redefine them to fit a computational paradigm. How shall he do it? The

method of choice currently is to appeal to supervenience. Supervenience encompasses a multiplicity of notions like emergence, hierarchy, systems theory, holism, etc. For the purposes of this discussion I shall limit myself to supervenience.

What then is supervenience? Supervenience begins with a simple motto: "No difference without a physical difference."[30] Supervenience, however, is not a crass form of physicalism. Philosopher Paul Teller cashes out this motto nicely:

> Imagine that in some given case or situation you get to play God and decide what's true. To organize your work you divide truths into two (not necessarily exhaustive) kinds. The first you call truths of kind P (for a mnemonic think of these as the *P*hysical truths...); and the second you call truths of kind S (for a mnemonic think of the truths of some *S*pecial science or discipline, such as psychology, sociology, ethics, aesthetics, etc.). You begin your work by choosing all the truths of kind P which will hold for the case. Then you turn to the truths of kind S. But lo! Having chosen truths of kind P, the truths of kind S have already been fixed. There remains nothing more for you to do....
>
> [Consider] all cases of actual watches turned out by the same assembly line and set identically. The truths of kind P will in this case be the physical truths about the watches' structure, and the truths of kind S will be truths describing the watches' time-keeping properties. Of course, with identical physical structure and setting, the watches will keep the same time. I will say that for collections of cases of this kind truths of kind S supervene on truths of kind P.[31]

To say the truths of type S supervene on truths of type P has the following succinct logical formulation:

$$\forall S \forall u \forall v \exists P[(Su \ \& \ \neg Sv) \rightarrow (Pu \ \& \ \neg Pv)].[32]$$

Here P ranges over physical predicates, S over nonphysical predicates, and u and v over objects in the real world.

Supervenience is to be understood hierarchically: what happens at a lower level (cf. P) constrains what happens at a higher level (cf. S). Thus the cognitive scientist might say that human intelligence (the higher level stuff) supervenes on human neurophysiology (the lower level stuff). Since supervenience is a transitive relation, and since human neuro-physiology in turn supervenes on human molecular biology which in turn supervenes on human atomic physics which in turn supervenes on human elementary particle physics, it follows that human intelligence supervenes on the underlying fundamental physics. At this point it is usually granted that we have bottomed out, having reached the lowest level of explanation.

Supervenience is not without philosophical difficulties. First and foremost among these is that supervenience is not a reductive analysis. For this reason certain philosophers (including this author) regard supervenience as mysticism in scientific dress. Philosopher of language Stephen Schiffer is unrelenting in this charge:

> "Supervenience" is a primitive metaphysical relation between properties that is distinct from causation and more like some primitive form of entailment.... I therefore find it more than a little ironic, and puzzling, that supervenience is nowadays being heralded as a way of making non-pleonastic, irreducibly non-natural mental properties cohere with an acceptably naturalistic solution to the mind-body problem.... The appeal to a special primitive relation of "supervenience"... is obscurantist. Supervenience is just epiphenomenalism without causation.[33]

How can supervenience be so wicked, especially sinced it is touted by so many naturalistic-minded philosophers? Supervenience offers no causal account of how lower levels constrain higher levels. If such an account were on hand, we should have a reductive analysis and be able to dispense with talk of supervenience—the idea of reduction has after all been around for some time, certainly preceding supervenience. Admitting ignorance of how lower levels affect upper levels and being willing to forego reductive analysis, Schiffer regards as philosophical treason. Those who employ supervenience as a philosophical research strategy Schiffer charges with dualism, obscurantism, metaphysics, and epiphenomenalism.

What then is supervenience? Supervenience begins with a simple motto: "No difference without a physical difference."

Given our overriding interest in the relation between intellect and brain, we ought to ponder whether supervenience is in any legitimate sense applicable to the mind-body problem. Mind is supposed to supervene on body just as time-keeping properties supervene on the physical structure of a watch. But is this a fair analogy? Examples like those of physical watches conjoined with nonphysical time-keeping properties are supposed to capture the idea of supervenience. Now there is a fundamental difference in the way time-keeping supervenes on the physical object which constitutes a watch and the way intellect can be said to supervene on the physical object which constitutes a

human body. Time-keeping supervenes on a watch because, and only because, our intellect contributes temporal concepts to the physical object which constitutes that watch. The hierarchy of levels basic to supervenience are levels we construct through our intellect. There seems therefore a self-referential paradox in saying of this intellect which constructs so many instances of supervenience that it itself supervenes on a physical system. The intellect plays a distinguished role in any supervenience account, and it is not clear that it is legitimate to turn it on itself and thereby proclaim that the very instrument we need to establish supervenience itself supervenes.

No treatment of supervenience would be complete without at least touching on the ever popular Doppelgänger examples.... What relation does an exact physical duplicate (the Doppelgänger) of a human being bear to the original human being?

The question of falsifiability also comes up. Let us say the intellect supervenes on the brain. How can we know this? What evidence would count to disprove this assertion? At the very least we would need an exhaustive account of the correspondence between brain states and mental states; for without an exhaustive account there would always remain the nagging uncertainty whether lower level properties are fully determinative of higher level properties—full determination of the higher by means of the lower is the definition of supervenience. Such an account would decide the mind-body problem one way or the other (cf. our cotton wadding example). But once we have such an exhaustive account, we can dispense with the notion of supervenience—such an exhaustive account will be a reductive analysis. What more then is the claim that intellect supervenes on the brain than bald assertion? Any scientific justification of supervenience will demonstrate far more than mere supervenience—it will tell a causal story. What more is supervenience than a materialist faith which makes lower levels determinative of higher levels?

No treatment of supervenience would be complete without at least touching on the ever popular Doppelgänger examples. These examples are philosophical thought experiments, science fiction stories if you will, that address the following question: What relation does an exact physical duplicate (the Doppelgänger) of a human being bear to the original human being? The human body is after all just an organized hunk of matter. What if we construct an atom for atom copy of this hunk, imparting to each atom the right relative momentum and energy state? In this construction, have we duplicated the original human's mental states? Does the Doppelgänger have a soul? Does the Doppelgänger experience pain? Would it be right to construct a Doppelgänger, freeze him, and later use his bodily organs for transplants in the original? Let us say we have the technology to construct Doppelgängers at will. Is it morally acceptable to build a teleportation device which sends an individual, say, to Mars by transmitting a complete specification of his body to Mars, constructing the Doppelgänger on Mars, and then destroying the original on earth?—after all, we don't want more than one of you in the universe at a given time. What is lost by destroying the original and letting your Doppelgänger run free? Stories about Doppelgängers can be multiplied almost endlessly.

Doppelgänger examples address the philosophical problem of personal identity: What does it mean for you to be you? Depending on one's point of view these examples can be entertaining or disturbing. Certainly a teleportation device like the one described would count decisively for supervenience and against immaterial souls and spirits. But we do well to remember that thought experiments are *thought* experiments precisely because they are impracticable. Thought experiments are not scientific experiments, and therefore cannot decide scientific questions. They are useful for raising interesting questions and may inspire concrete scientific experiments. But they are hypothetical in the extreme. Willard Quine has some sobering words on the matter:

> The method of science fiction has its uses in philosophy, but ... I wonder whether the limits of the method are properly heeded. To seek what is "logically required" for sameness of person under *unprecedented circumstances* is to suggest that words have some logical force beyond what our past needs have invested them with.[34]

Another reason for not being unduly swayed by Doppelgänger examples is quantum mechanics. Quantum mechanics, with the limitation it places on measurement at the micro-level, makes it highly doubtful whether human technology is capable of building the scanning and reconstituting devices necessary for the construction of Doppelgängers.

Commenting on the teleportation device in *The Emperor's New Mind*, physicist Roger Penrose writes,

> Is there anything in the laws of physics which could render teleportation in principle impossible? Perhaps ... there is nothing in principle against transmitting a person, and a person's consciousness, by such means, but that the "copying" process involved would inevitably destroy the original? Might it then be that the preserving of two viable copies is what is impossible in principle?... I believe that [these considerations] provide one pointer, indicating a certain essential role for *quantum mechanics* in the understanding of mental phenomena.[35]

Penrose, the physicist, conflates fundamental physics with consciousness and mental phenomena so as to give physics almost a mystical role. Still, his observations should be considered before lending too much credence to the Doppelgänger examples.

The question still remains, Is your physical replica you? I am unwilling to answer this question without qualification. For me, quantum mechanics, nonlinear dynamics (chaos), human physiology, and probability theory all conspire to make the premise this question requires me to grant, namely, the existence of my Doppelgänger, about as plausible as Greek mythology. Nevertheless, I take anything to be possible and admit that all my beliefs are falsifiable given the right circumstances.[36] If I should be confronted with my Doppelgänger, and if this double were constructed by purely mechanical means at the hands of human technicians, I should decide in favor of supervenience. But for me the important question is how the Doppelgänger came into existence. No doubt I'm biased, but without a causal story of the Doppelgänger's origin, I would attribute his existence to God. But once God is back in the picture, I have no problem attributing to my Doppelgänger an immaterial spirit. So we're back where we started.

The Dilemma of Semi-Materialism

Earlier I described three approaches to the mind-body problem: the substance dualism of Descartes, the monism of Spinoza, and the historic Judeo-Christian position. I want now to focus on a fourth option which has of late been gaining currency in theistic circles. I shall refer to this view as semi-materialism.[37] By semi-materialism I mean a philosophical position which on the one hand acknowledges the God of Scripture, but on the other denies that man's soul and spirit have an ontology distinct from (i.e., not derivative from) the body. Semi-materialism is a melding of traditional theology and supervenience. God is still creator, sovereign, and transcendent, but man is now fully realized in his human body.

It is important to understand that semi-materialism is not solely a question of methodology. Treating the human person as a physical system is not merely a scientific research strategy for the semi-materialist. The semi-materialist accepts supervenience—no difference without a physical difference—and therefore holds that talk of souls and spirits by the ancients is a prescientific way of describing consciousness as it emerges from the human physical system. Thus apart from man's moral responsibility to God, the semi-materialist has no great quarrel with the cognitive scientist. Both are content to view man as strictly a physical system. On the question of God they do of course differ. But semi-materialism compartmentalizes anthropology and theology so that whenever traditional theology conflicts with a supervenient anthropology, the former gets reinterpreted to jibe with the latter.

By semi-materialism I mean a philosophical position which on the one hand acknowledges the God of Scripture, but on the other denies that man's soul and spirit have an ontology distinct from (i.e., not derivative from) the body.

The late Donald MacKay was an outstanding example of a semi-materialist. MacKay was a professor of communications at Keele University in England who specialized in brain physiology. Eleven years ago he wrote a book entitled *Human Science and Human Dignity*.[38] Throughout the book he emphasized the need to examine the data of science and theology dispassionately. His goal was to develop an integrated view of man. How was this integration to be accomplished? The following passage is revealing:

> [With] a hierarchy of levels there is no question of keeping the different explanations in "watertight compartments": what someone has called "conceptual apartheid." Although their categories are different and they are not making the same statements, by calling them hierarchic we commit ourselves to the view that there is a definite *correspondence* between them. In particular, no change can take place in the conscious experience reported in a higher-level story without some corresponding change in the stories to be told at the lower level (though again, not conversely). On this view, the way to an integrated

> understanding of man is not to hunt for gaps in the scientific picture into which entities like "the soul" might fit, but rather to discover, if we can, how the stories at different levels correlate.[39]

Although MacKay speaks of *correspondence* between levels, he really means something much stronger, namely *determination*. To see this, I call the reader's attention to the sentence, "no change can take place in the conscious experience reported in a higher-level story without some corresponding change in the stories to be told at the lower level (though again, not conversely)." The phrase "not conversely" is decisive; it demonstrates that he takes the lower levels as fixing the upper levels. This is supervenience. In fact, it is the same brand of supervenience we described in the last section. It follows that MacKay's view faces the same objections we raised in the last section against supervenience. These objections he fails to address since in his integration of theology and anthropology he takes supervenience as a given, reinterpreting theology in its light.

If we accept that God can interact causally with the material universe, why should it be inconceivable that a human spirit can interact causally with a human body?

Now theology is not so malleable an instrument as to yield to scientific pressure. The problems of trying to reconcile a supervenient anthropology with a traditional theology invade the whole of theology. Thus much of what MacKay calls the "traditional imagery" associated with death has to be discarded or reinterpreted.[40] What are we to make of the incarnation of Christ? Do Jesus' soul and spirit fit into the semi-materialist's hierarchy of levels?[41] What about miracles? If we accept that God can interact causally with the material universe, why should it be inconceivable that a human spirit can interact causally with a human body? MacKay accepts a general resurrection of mankind. Yet within the semi-materialist framework it is not clear how humans are anything more than lumps of matter in motion, which at the resurrection are simply reconstituted and again set in motion.

For me the chief difficulty with semi-materialism is that from God's perspective it trivializes man. Because of its supervenient anthropology, semi-materialism gives us a man whose soul and spirit are not only inseparable from the body, but actually derived from the body. Now why should this man be trivial from God's perspective? To answer this question let us return to the Parable of the Cube. Suppose I am watching the cube move around inside the box. Its motion can be explained in several ways: (1) The cube just sits there at rest. (2) The cube traces some predictable trajectory. (3) The cube moves randomly. (4) I control the cube's motion, say with a joystick. (5) Some other intelligent agent controls the cube's motion. These cases are exhaustive, though as we shall see immediately, they are not exclusive. Moreover, depending on one's view of causality, (3) may be vacuous.

For me the chief difficulty with semi-materialism is that from God's perspective it trivializes man.

Cases (1) and (2) are really superfluous since they can be subsumed under case (4). For case (1) this is obvious. If case (4) holds, then I have complete control over the cube's motion. I now decide to keep the cube at rest, say by leaving the handle of my joystick alone. This is just case (1). In this way (4) subsumes (1). What about (2)? To say that the cube's motion is predictable is to say that there is some description that prescribes the cube's motion. Moreover, since the motion is predictable, I actually have that description. Thus I can take that description, follow its instructions, and cause the cube to move in the prescribed manner. But this is just case (2). Thus (4) subsumes (2) as well.

Now my contention is that of the three remaining cases only case (5) is interesting. In (3) the cube's motion is so unpredictable and erratic that I never expect to receive a coherent message. This is like the monkeys' random typing. I may look for patterns in the cube's motion, but as soon as I think I've got the hang of what the cube is doing, it disappoints me and does something else. I see no rhyme nor reason to what the cube is doing. This case is thoroughly unsatisfying to my intellect. Case (4) is also uninteresting. All I'm doing is moving the cube around. I feel like moving it here, so I move it here. Next I feel like moving it there, so I move it there. If I've got a copy of *Hamlet*, I can move the cube in such a way that its motion encodes *Hamlet*. But this is no fun—I might just as well read *Hamlet* directly. If I had more cubes, I

might make some interesting designs. If I had multicolored cubes I could let my imagination run wild and pretend I'm an artist. But with only one cube the situation is dull indeed. Only when another intelligence is moving the cube and communicating with me through its motion does cube watching become interesting. It was case (5) that towards the beginning of this essay resulted in the frenzy we called religious cubism.

Now consider God's relation to the material universe. God created the universe. The universe is finite.[42] How does God view the universe? He knows it in every detail. He sees the end from the beginning; it holds no surprises for him. Now instead of a cube in a box, let us imagine a universe in a box. In this case God is the observer outside the box. This is certainly legitimate, since God is transcendent, in no way conditioned by his creation. Whereas we were looking at the motion of but one cube, God is looking at the simultaneous motion of all the various bits and pieces of matter that constitute the universe, seeing them in all their many configurations. God is particularly interested in humans, so he pays special attention to those bits of matter that constitute us.[43]

There is no novelty, no thrill, no satisfaction for God in simply controlling the universe as a giant toy. To him it is like a cube in a box, only simpler.

When God is watching us, which of the three remaining cases holds? Case (3) is clearly out of the question. Randomness exists only where there is ignorance. No surprises await God. He sees history at a glance. Thus for theism case (3) is vacuous.[44] What about case (4)? In this case the universe is a giant toy which God controls with a sophisticated joystick. The only problem is that this toy cannot amuse God. Just as a cube in a box makes for a dull toy, and cannot amuse us unless another intelligence influences it, so a universe subject only to God's intelligence is a dull toy for God, only in the extreme. In fact, for our limited intellects, moving a single cube inside a box presents a greater challenge than for God to run the universe, whether by natural law or by direct intervention. There is no novelty, no thrill, no satisfaction for God in simply controlling the universe as a giant toy. To him it is like a cube in a box, only simpler.

This leaves us with case (5). To us a cube in a box is only interesting when an intelligence other than ourselves uses it to communicate with us. The same holds for the material universe and God. The only reason the universe is interesting to God is because there are intelligent beings, namely us, who express themselves through the universe, namely the matter that constitutes our bodies. If these intelligences are not external to the universe, then we land in case (4): a toy universe populated by toy people subject to a bored God who cannot be amused. Only case (5) entails a non-trivial creation in the light of its creator. There are no other possibilities.

The only reason the universe is interesting to God is because there are intelligent beings, namely us, who express themselves through the universe, namely the matter that constitutes our bodies.

This analysis gives the lie to a sentiment common in scientific circles. Accordingly, as we learn more and more about the immensity of the universe, we should think less and less of ourselves. Alternatively, the universe is such a big place that we must be insignificant. The foregoing analysis shows that without humans, intelligent creatures created in the image of God, the universe itself is insignficant, at least in the sight of God. Size has simply no bearing on significance, least of all to the mind of God. It is because we are here that the universe is significant. However small we become in relation to the universe is simply of no consequence. It is worth repeating Pascal's famous dictum: "By space the universe encompasses and swallows me up like an atom; by thought I comprehend the world."

The historic Judeo-Christian position on mind and body entails that God's view of the universe corresponds to case (5). To what case does the semi-materialist's view correspond? For the semi-materialist how does God view the universe, and more particularly man? By assuming supervenience, the semi-materialist has made it clear that he will not hunt for gaps in the scientific picture of man; he will not look for places into which he can fit soul and spirit. His refusal to look beyond the physical aspect of man is not, as we have already noted, simply a question of scientific methodology. Semi-

materialism is an attempt by theists to unite science and theology in a consistent framework.

By a process of elimination we find that the semi-materialist's universe is a case (4) universe, the toy universe populated by toy people. Logic yields him no alternatives. The semi-materialist must forego case (3)—a random universe which God cannot predict—unless he wants to question God's omniscience. He must also forego case (5), since he derives human intelligence solely from its expression through matter. This leaves case (4). But since matter is finite and the dynamics of matter taken by itself are trivial to God's intellect, a case (4) universe makes for insipid theology. I would go so far as to say that a case (4) view of man ruins both anthropology and theology. The consequences of a case (4) universe are far reaching.

By a process of elimination we find that the semi-materialist's universe is a case (4) universe, the toy universe populated by toy people. Logic yields him no alternatives.

This was brought home to me after a recent conference at Trinity Evangelical Divinity School.[45] At this conference James I. Packer delivered a talk entitled "Evangelicals and the Way of Salvation: New Challenges to the Gospel, Universalism, and Justification by Faith." The talk created something of a stir since in it Packer called his compatriot John R. W. Stott to account for the latter's recent expressed views on conditionalism. Apparently Stott has subscribed to a form of conditionalism for some time, but has only recently gone public with these views. According to conditionalism, at the end of the age the righteous are raised to immortality and eternal life (eternal life being something they do not now possess), while the unrighteous are annihilated, their existence being erased from the warp and woof of reality. This took many of us by surprise since Stott is a leading and respected Christian thinker.

Conditionalism is of course a recurrent heresy in the Church, and to see it associated with so distinguished a name was a source of puzzlement. Actually, it ought not to have been puzzling. Ten years before the conference Stott had openly subscribed to a supervenience view of mind and body. Granted, he did not use the word "supervenience." But in writing the foreword to MacKay's book *Human Science & Human Dignity*, Stott left no doubt about accepting MacKay's "hierarchy of levels." MacKay's book arose out of his 1977 London Lectures in Contemporary Christianity. Commenting on the book and the lectures, Stott wrote,

> I listened to Professor MacKay's lectures with absorbed interest. His keen mind penetrates the heart of every argument, and coolly, dispassionately, he exposes logical fallacies wherever he detects them, in Christians and non-Christians alike.... He is determined to hold fast to the truth in its wholeness. His well-known rejection of reductionism ... is matched by his resolve to face and to integrate all the available data. Above all, while readily acknowledging that from one point of view a human being is an animal, and from another a mechanism, he refuses to stop there. In order to do full justice to human beings, he introduces us to the concept of a "hierarchy of levels" at which human life is to be understood and experienced.[46]

Let me stress it again: This is supervenience. I have argued that supervenience plus God entails a case (4) universe. I shall now go so far as to charge that conditionalism and annihilationism are not merely consistent with a case (4) universe, but logically necessary. My justification for this claim is simply this: for a just God to make a strictly finite material human being (the only human being a case (4) universe has to offer) suffer the torments of hell for eternity is to render infinite punishment for finite fault. The logic of a case (4) universe requires an untraditional view of hell.

With all the pain and suffering, why doesn't God do something? This is a valid question.

The problem of evil is always a problem, but in a case (4) universe it becomes a catastrophe. Since we assume God is all-powerful and all-knowing, he can constitute and reconstitute matter any way he likes. Since there are no immaterial souls or spirits, our intelligence, behaviors, diseases, social structures, national boundaries, successes, wars, sins, etc., etc. all derive from the way matter is constituted. In each of these instances much is to be desired. With all the pain and suffering, why doesn't God do something? This is a valid question. In a case (5) universe we take comfort in knowing that events in the material universe are the unfolding of a drama that is grounded in eternity, of which we are a part.[47] But in a case (4) universe all such comfort is a sham. All the bereaved mother can say

is, God could have kept my child from dying, but he didn't. All the criminal can say is, God could have altered my sociopathic brain-states, removed me from the crime-infested ghetto in which I grew up, and thereby given me the opportunity to be an upstanding member of society—but he didn't. Of salvation it can only be said, It is God's choice whether to constitute your brain to be favorably or ill disposed towards him. So much for the doctrine of predestination.

Of salvation it can only be said, It is God's choice whether to constitute your brain to be favorably or ill disposed towards him. So much for the doctrine of predestination.

In a case (4) universe, how does God respond to prayer? Suppose I am suffering from an addiction and pray to God that he remove it. Since I have no immaterial soul or spirit, the only help God can offer is material. Well, what does God do in response to my prayer? Does he miraculously reconstitute my brain in some way or alter my body chemistry so that my addiction is removed, though otherwise keeping me the same person? Here lurks the problem of personal identity. Or does he do nothing? Is it simply that praying is physiologically good for me and that the prayer accomplishes its end simply in the praying? Is it that God has built into my body a predisposition that makes prayer good for me? Are God's responses to prayer simply secondary causes he built into the universe at the point of creation?

The Historic Position

Earlier I described the historic Judeo-Christian position on mind and body as holding that the human being unites physical body and immaterial spirit into a living soul for which separation of body and spirit is unnatural and entails death. I also emphasized that this position demands an expanded ontology: unlike semi-materialism with its commitment to supervenience, the historic position does not see spirit as a derivative of the complex physical system that makes up the human body. My purpose here is not to expound this historic anthropology, but to trace a bit of its history and examine how it has gone from the prevailing position in the West to the status of a quaint relic.

The position as I have stated it is but a straightforward restatement of the Genesis account of man's creation:

> The LORD God formed the man from the dust of the ground [body] and breathed into his nostrils the breath of life [spirit], and the man became a living being [soul].[48]

In the New Testament we find both Paul and James echoing this passage. Thus Paul writes,

> If Christ is in you, your body is dead because of sin, yet your spirit is alive because of righteousness,[49]

whereas James writes,

> As the body without the spirit is dead, so faith without works is dead.[50]

Now the Bible is not a book of systematic theology, nor does it explicitly block all modern moves at reinterpretation. Thus is does not call supervenience by name, nor does it explicitly reject supervenience as a plausible account of spirit and soul. But if we trace the course of western theology, we see that theologians before the age of modern science held views which cannot be reconciled with semi-materialism and its concomitant supervenience. Thus Augustine does more than echo the Genesis account of man when he states his own position on death, a position which becomes increasingly difficult to reconcile with supervenience.

> As regards bodily death, that is, the separation of the soul from the body, it is good unto none while it is being endured.... For the very violence with which the body and soul are wrenched asunder, which in the living had been conjoined and closely intertwined, brings with it a harsh experience, jarring horridly on nature so long as it continues, till there comes a total loss of sensation, which arose from the very interpenetration of spirit and flesh.[51]

The idea of spirit and flesh interpenetrating has a distinctly different feel from supervenience.

With Aquinas we find the historic position coming into full bloom. Thus he writes,

> It must necessarily be allowed that the principle of intellectual operation which we call the soul is a principle both incorporeal and subsistent.[52]

Even this statement might be reconciled with semi-materialism if one conceives of the soul as an abstract algorithm (say ensconced in a Platonic heaven) which the body qua machine instantiates. But this reinterpretation becomes implausible in the light of his following comment:

> The intellectual soul, because it can comprehend universals, has a power extending to the infinite; therefore it

> cannot be limited by nature either to certain fixed natural judgments, or to certain fixed means....[53]

Computer algorithms are finitary and therefore clearly "limited by nature either to certain fixed natural judgments, or to certain fixed means." But for Aquinas the intellectual soul transcends the finite, having "a power extending to the infinite." At this point in the evolution of theology I see no way of reconciling the historic position with semi-materialism.

At this point in the evolution of theology I see no way of reconciling the historic position with semi-materialism.

Even Descartes appreciated the importance of the historic position. In the *Discourse on Method* he writes,

> Although machines can perform certain things as well as or perhaps better than any of us can do, they infallibly fall short in others, by which means we may discover that they did not act from knowledge [cf. the intellect], but only from the disposition of their organs [cf. programming, algorithms, state of the machine]. For while *reason is a universal instrument which can serve for all contingencies*, these organs have need of some special adaptation for every particular action. From this it follows that it is morally impossible that there should be sufficient diversity in any machine to allow it to act in all events of life in the same way as our reason causes us to act.[54]

Descartes' point of departure from the historic position was his commitment to mechanism and its consequent substance dualism which compartmentalized reality into physical and spiritual parts so that the two could no longer interact coherently. Because of his mechanism Descartes wanted only the most tenuous connection between physical and spiritual reality, looking for an immaterial soul to interact with a physical body solely at the now infamous pineal gland. But mechanism is opposed to all gaps in physical causality. Had he held to the older view that causality cannot be fundamentally understood in purely physical terms (a view, by the way, not inconsistent with modern quantum mechanics) he would not have propounded his substance dualism, which to philosophers unsympathetic to theology is easily truncated by removing the spiritual component completely.

Finally in Kant we have a decisive break with the historic position. Subscribing completely to the mechanism inherent in Newtonian mechanics, Kant refused to consider causality outside of space and time.[55] Since spirits do not reside in space and time, it follows that they can have no influence on what occurs in the physical world—at least no influence of which we can have any knowledge. With Kant the only knowable reality is physical reality embedded in space and time. A reality in which matter and spirit can freely interact, where they can interpenetrate, to use Augustine's idea, is disallowed. Though Kant's critical philosophy has been to some extent discredited because of his total and absolute acceptance of Euclidean geometry and Newtonian mechanics as determinative of reality, the sense that what is knowable is solely the physical, and that it is known solely through the physical, persists. Its modern day outworkings include materialism generally, physicalism, and of course supervenience.

In this day is the historic position still tenable? In holding it, does one subscribe to a god-of-the-gaps solution to the mind-body problem? The modern Zeitgeist holds that since the 17th century science has been closing in on theology, constantly shrinking its legitimate domain of competence. Are the scientific gaps in our knowledge of the relation between mind and body at the vanishing point so as effectively to banish spirit from the human person? In response, I must say that not only do I take the historic position as still tenable, but I take it as the only tenable position for the theist who claims to adhere to anything like a traditional theology.

God-of-the-gaps solutions are particularly embarrassing when scientists are told what they can't do, and then go ahead and do it.

God-of-the-gaps solutions have, since the Church's incompetent handling of Copernicus and Galileo, left a bad taste in the mouth of sincere intellectuals. God-of-the-gaps solutions are particularly embarrassing when scientists are told what they can't do, and then go ahead and do it. Nevertheless, there are gaps, and then there are gaps—not all gaps are created equal. Thus there are gaps that science has decisively filled, e.g., heliocentrism has with finality displaced geocentrism. Then again, there are gaps which science claims to have filled which on closer inspection in fact failed to be filled. Thus Newtonian mechanics claimed to give an exhaustive account of the dynamics of matter. For two centuries scientists claimed this gap was filled.

But in the 20th century along came general relativity and quantum mechanics. The sense that science is closing in on all bankable truth is therefore misleading. Science is much more like the stock market than a bank, exhibiting erratic fluctuations and sharp dips—Newtonian stock, for instance, has fallen sharply this century.

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Now there is still another type of gap, and these are the gaps which theology imposes on human knowledge. The Scriptures refer to these as *mysteries*. On this point Wittgenstein has a pertinent observation:

> It may easily look as if every doubt merely *revealed* an existing gap in the foundations; so that secure understanding is only possible if we first doubt everything that *can* be doubted, and then remove all these doubts.[56]

Science seeks to remove all doubts and fill all gaps, but on its own terms. Now there are gaps which theology says science shall never fill. In prescribing such gaps, theology issues a challenge to science. On the basis of these gaps science can break theology (though it cannot make theology); to break theology it need merely fill these gaps. Let me be so bold as to say that theology is falsifiable by science. Though such a claim runs counter to the ever popular compartmentalization of science and theology, it is true.

The apostle Paul recognized the falsifiability of theology when he noted, "If Christ has not been raised, our preaching is useless and so is your faith." Theology cannot be reconciled with an arbitrary collection of facts. If some purely naturalistic therapy could, for instance, be devised that would rid the world of behavior which in times past was attributed to sin, then the whole moral force of Scripture and the atonement of Christ would be called into question. For the present discussion, if cognitive scientists could devise a computer which captured a sufficiently broad spectrum of human cognitive abilities, I would say the cognitive scientists had proven their point. Certainly the historic position would be discredited.[57] Let me hasten to add, however, that cognitive science is not only far from achieving such a goal, but, as I would argue on theoretical grounds, attempting to solve a problem without a scientific solution. I'll touch on these points in the following closing section.

Concluding Remarks

The philosophy that drives cognitive science is a materialism committed to explaining man via computation. To justify this philosophy the cognitive scientist writes computer programs that attempt to capture intelligent human behavior. The grander and more encompassing such programs, the better. Computers, however, are not cheap. The government agencies that fund research don't distribute money like drunken sailors. Thus to justify hefty research grants, cognitive scientists make promises they can't keep. Just as in the late 50's and early 60's, when language translators were going to make keeping up with the Soviets a breeze, the same euphoria persists today. Thus, as we noted earlier, H. Moravec, the director of Carnegie-Mellon's Robotics Institute, feels no compunction when he predicts that the next century will be populated by robots that displace the human race.[58] And if this be so, is it not incumbent on the research agencies to fund Moravec and hasten his prophecy? Or consider C. G. Langton of the Santa Fe Institute who has recently edited a book entitled *Artificial Life*, the proceedings of a conference by the same name. Artificial life conjures visions of Frankenstein's monster, of man tearing himself out of nature and raising himself by his bootstraps. Even the U. S. Department of Energy felt the need to sponsor this vision.[59] But on closer examination one sees that artificial life is pretty computer pictures and clever computer algorithms.

Even if human intelligence is physically realizable through an electronic computer, a hypothesis I reject, it is by no means obvious that human intelligence is capable of realizing it.

Cognitive scientists suffer a conflict of interest. Coupled with the need for a quick fix in the form of research monies, cognitive science too often degenerates into propaganda. Claims are inflated and difficult problems get swept under the rug. Even if human intelligence is physically realizable

through an electronic computer, a hypothesis I reject, it is by no means obvious that human intelligence is capable of realizing it. Thus even if some superintelligence could build a computer that, to use Pylyshyn's phrase, is a "literal model of mental activity," it is not at all clear whether cognitive scientists have the brains, if you will, to get the job done. The problems are daunting; in fact so daunting that humility is the order of the day.[60] The tendency is to inflate one's position at the expense of truth. This is bad. I have written on this topic elsewhere:

> Inflation is a problem in science as well as economics. Partial results, admissions of ignorance, and uncertainty in general do not elicit the adulation of confident, bold assertions. The tendency is to inflate the supposed validity of one's cause. Politicians are rewarded for the confidence they evince, however ill founded, and penalized for their lapses into diffidence, however well founded. Art authenticators are expected to deliver a definitive verdict on a work of art and will do so, particularly if they are the acknowledged authorities on the artist in question, even though in certain instances they may be less than justified in handing down such verdicts, instances confirmed by the numerous fakes that have ended up in museums. So too [cognitive] scientists are notorious for overplaying their cards.[61]

We should demand a distinction between philosophy and science; not a separation but a distinction. We should be very clear on what the cognitive scientist has indeed accomplished, and what doctrines the cognitive scientist qua philosopher is advocating. We should also take a high view of intelligence. Because the cognitive scientist's accomplishments are in fact so meager, it is easier for him to vitiate human intelligence than to admit his insignificant progress. This must not be permitted. Consider for example the following remarks by Roger Schank, now at Northwestern University, but formerly director of Yale's Artificial Intelligence Project:

> There is a difference between merely matching or displaying a set of English sentences in response to a specific initial English sentence and understanding the meaning of such a sentence. But what is the dividing line? When does mere pushing around of meaningless symbols inside the computer become understanding? If it were possible to get a computer to respond reasonably to sentences such as the above [sentences about characters in a simple story], could it be said to understand them? We already have created programs that enable a computer to respond to such phrases at fairly deep levels, in different syntactical arrangements, and with different expressions for the same events. It is hard to claim that the computer understands what *love* is or what *sadness* is. It is hard for most people to claim that they understand what *love* and *sadness* are.[62]

I would take issue with Schank about his computer program responding to phrases "at fairly deep levels": the stories to which his scripts program is responding are too contrived and simple to deserve anything like the designation "deep."[63] More objectionable, however, is his conclusion that because humans understand love and sadness imperfectly, humans ought therefore to admit that computers can understand these concepts as well. Schank's very notion of understanding is defective. This humiliation of the human intellect to bolster the negligible successes of cognitive scientists is all too common.

Those who hold to the historic position on mind and body should find encouragement in what I call the *Law of Priority in Creation*. I would like to see this law elevated to a status comparable with the laws of thermodynamics. The law is not new with me. It is found in Scripture:

> Jesus has been found worthy of greater honor than Moses, just as the builder of a house has greater honor than the house itself.[64]

The creator is always *strictly greater* than the creature. It is not possible for the creature to equal the creator, much less surpass the creator. The Law of Priority in Creation is a conservation law. It states in the clearest possible terms that you can't get something for nothing. There are no free lunches. Bootstrapping has never worked.

The creator is always* strictly greater *than the creature. It is not possible for the creature to equal the creator, much less surpass the creator. ... I would like to see this law elevated to a status comparable with the laws of thermodynamics.

With the rise of atheistic evolutionism, the West has en masse repudiated this law. The creature is henceforth greater than the creator, for man has surpassed inanimate nature, whose creation he is. Cognitive scientists also repudiate this law in their work. Their dream is to build a computer that will shame us, that will so surpass us intellectually as we do the apes. The Law of Priority in Creation, however, repudiates their programme. For the computers they build, the programs they write all testify of a creative genius in man which surpasses the objects it creates. For any computer program that is supposed to rival the human intellect, I mere-

ly point to the human author who conceived the program. According to the Law of Priority in Creation the cognitive scientist's programme is self-refuting.[65]

Finally a few comments about the subtitle of this essay are in order. Alchemy was the programme of the middle ages for transmuting base into precious metals. It sought to accomplish this by a combination of naturalistic and mantical means. The key to this transmutation was the philosopher's stone, an imaginary substance thought capable of performing the desired transmutation. In connection to cognitive science, the following observation is almost prophetic:

> Alchemists became obsessed with their quest for the secret of transmutation; some adopted deceptive methods of experimentation, many gained a livelihood from hopeful patrons. As a result, alchemy fell into disrepute.[66]

Cognitive science has become today's alchemy. Cognitive scientists are obsessed with transmuting matter into mind. Unsound philosophy has deceived them into believing that the philosopher's stone is found in the computer. They gain a livelihood from hopeful patrons at the Defense Department, the National Science Foundation, and other funding agencies. Cognitive science has, unfortunately, yet to fall into disrepute.

I am, however, committed to viewing computers and the programs they run as tools for my intellect, much as hammers are tools for my hands, and not as my peers.

I am describing the spurious philosophical enterprise called cognitive science. Just as alchemy was legitimized when it gave up its grandiose ambitions and turned to chemistry, so too, one may hope, cognitive science will cast off its pretensions and turn to what I have called the science of cognition. In taking information processing as its paradigm for examining human cognition, the science of cognition is a branch of computer science—it is legitimate and cannot be impugned. I encourage scientists to press on in the science of cognition and determine just how much of human cognition can be represented computationally. Such a research programme does not threaten me. I am, however, committed to viewing computers and the programs they run as tools for my intellect, much as hammers are tools for my hands, and not as my peers. Cognitive science degenerates into a spurious philosophical enterprise when computers are no longer viewed as tools, but as potential peers or superiors.

Church's thesis tells me that man qua scientist can do no better than understand the human intellect in terms of an information processing model. But it is the height of presumption for man qua philosopher to claim this model is all encompassing. The cognitive scientist finds this unacceptable because he does not like what he deems as arbitrary limits imposed on the pursuit of knowledge. Actually, no such limit has been imposed. Let him pursue a legitimate scientific research programme as far as he can. But let him remember that the facts point resoundingly to a very imperfect understanding of man in purely scientific categories; that sound philosophy is consistent with this finding, indicating that scientific categories may well be inadequate for a complete understanding of man; and that historic Judeo-Christian theology, by looking to transcendence in both man and God, affirms this state of affairs will continue.[67] ✻

NOTES

[1]Posner [1989: 1].
[2]See Moravec [1988].
[3]I am grateful to a referee for this phrase.
[4]Posner [1989: 29].
[5]In the computer scientist's parlance, the box with its cube constitutes an oracle, i.e., a black box which answers questions we ask of it.
[6]See Wilder-Smith [1975: 63; 1981: 83-84].
[7]See Bowler [1989: 222-228] for the problem of design and teleology in Darwinism.
[8]Bauer [1981: 172] has a standard mathematical treatment of this law.
[9]Cf. Gn. 2:7, Rom 8:10, and Jas. 2:26.
[10]Actually, it is arguable whether Cabanis has not in fact been refuted, though the evidence is anecdotal. In an article appearing in *Science* entitled "Is Your Brain Really Necessary?," a case study of John Lorber, a British neurologist and professor at Sheffield University, is reported [Lewin 1980: 1232]:

> "There's a young student at this university," says Lorber, "who has an IQ of 126, has gained a first-class honors degree in mathematics, and is socially completely normal. *And yet the boy has virtually no brain.*" The student's physician at the university noticed that the youth had a slightly larger than normal head, and so referred him to Lorber, simply out of interest. "When we did a brain scan on him," Lorber recalls, "we saw that instead of the normal 4.5-centimeter thickness of brain tissue between the ventricles and the cortical surface, there was just a thin layer of mantle measuring a millimeter or so. His cranium is filled mainly with cerebrospinal fluid." [my italics]

It is debatable whether the complexity of this student's miniscule brain is adequate to account for his obvious intelligence.

Such examples are not isolated. As Stanley Jaki [1969: 115-116] observes,

> A brain may largely be deteriorated and still function in an outstanding way.... A famous case is that of Pasteur, who at the height of his career suffered a cerebral accident, and yet for many years afterwards did research requiring a high level of abstraction and remained in full possession of everything he learned during his first forty some years. Only the autopsy following his death revealed that he had lived and worked for years with literally one half of his brain, the other half being completely atrophied.

Such evidence is, of course, anecdotal, as is the evidence for miracles. But it is also highly inconvenient, especially for brain researchers who imagine their research fully circumscribes mentality.

[11]Jones [1981: 38-39].
[12]Spinoza [ca. 1675: 371].
[13]Paul Churchland seems one of the few to maintain this hope when he writes of folk psychology being displaced by neuroscience. See Churchland [1984].
[14]All three quotes are taken from Jaki [1969: 72,133, and 126 resp.].
[15]Theoretical computer scientists John Hopcroft and Jeffrey Ullman [1979: 14] write,

> It is also tempting to view the human brain as a finite state system. The number of brain cells or *neurons* is limited, probably 2^{35} at most. It is conceivable, although there is evidence to the contrary, that the state of each neuron can be described by a small number of bits. If so, then finite state theory applies to the brain. However, the number of states is so large that this approach is unlikely to result in useful observations about the human brain, any more than finite state assumptions help us understand large but finite computer systems.

In the next section I shall argue that finite state theory is indeed applicable to the brain.

[16]Herbert Grosch offers some earthy remarks [quoted in Jaki 1988: 121-122]:

> The emperor, whether we call him fifth-generation project or artificial intelligence, is stark from the ankles up. Or to put it in the vernacular, most of what we're talking about is a bunch of crap. Now I said from the ankles up. From the ankles down the emperor is wearing a well-worn and sturdy pair of shoes ... and we call them expert systems ... they are good. We need lots and lots of expert systems. And we'll grind them out the way we've been grinding them out for thirty years. We won't generate them with magic. We won't generate them with artificial intelligence.

[17]Pylyshyn [1986: 43].
[18]Pylyshyn [1986: 40].
[19]For a readily accessible treatment of recursion theory see Cutland [1980].
[20]See Hopcroft & Ullman [1979: chapters 12 & 13] and Garey & Johnson [1979].
[21]Pascal [ca. 1670: 234], *Pensées*, no. 348.
[22]This level is sufficiently macro as to avoid quantum indeterminacy; random effects get averaged out.
[23]A precise analysis would lead us too far afield, and would in the end distract rather than enlighten the reader. I ask the reader to concentrate on the conclusions. I am convinced the argument can be tightened to the point where it will satisfy someone like myself, a research mathematician, but the cost would entail more mathematical detail than the general reader might desire. In the argument I do point out some weaknesses and places where refinement is possible.
[24]Cf. 2 Cor. 5:10. Also Rom. 2:6 and Rev. 20:12,13.
[25]See Dreyfus [1972], Weizenbaum [1976], and Roszak [1986].
[26]Gödel's incompleteness theorem is sometimes invoked as a refutation of AI (see Jaki [1969: 214-216] for a summary). Nevertheless, the present observations about behavioral sequences show that Gödel's theorem cannot refute AI. As we noted, all human experience and behavior is finite and can be encoded as a string of 0's and 1's. So far we have concentrated on an individual named Frank and his behavioral sequence $\mathbf{S}_{\text{Frank}}$. Let us now pick on Gödel. Consider $\mathbf{S}_{\text{Gödel}}$. $\mathbf{S}_{\text{Gödel}}$ encodes among other things the period around 1930 when Kurt Gödel was proving his famous theorems and constructing his Gödel sentences. All his mathematical work is encoded in this finite sequence. Thus while Gödel was busy working at the foundations of recursion theory and leading us to the paradise of partial recursive functions—which can compute anything, even the full spectrum of human behavior—Gödel's own actions were finite and could be encoded by a very simple partial recursive function epitomized in $\mathbf{S}_{\text{Gödel}}$.
[27]All such relations can be realized through partial recursive functions. This is immediately obvious from any definition of computability. See Weihrauch [1987: chapter 1] or any other basic book on recursion theory. Cutland's [1980: chapter 1] approach via unlimited register machines is especially straightforward.
[28]In 1935 the Princeton logician Alonzo Church proposed the following thesis: The formally computable functions (i.e. partial recursive functions) are precisely those functions which are intuitively computable. Weihrauch [1987: 87] comments,

> Church's Thesis marks the border line between computability and noncomputability. It is not a theorem since the concept "intuitively computable" is not precisely defined. There is no doubt that every [formally] computable function is intuitively computable. *But although no ... function which is intuitively computable but not [formally] computable has been found,* it is still possible that Church's Thesis does not hold [italics mine; thus for over 50 years Church's Thesis has not been disconfirmed]. Church's Thesis does not influence the [abstract] theory of computability, ... it is only used for interpreting the results [of the abstract theory]. Suppose some function ... is not [formally] computable. Then by Church's Thesis we may say that there is no algorithmic method, no algorithm, for computing [this function].

[29]One can argue that analog machines require infinite gradation and therefore provide a counterexample to the claim that computers encompass all of "machinedom." Actually, analog machines are an abstraction which by moving to infinite gradations circumvent the difficult combinatorial problems inherent in a discrete analysis. It is important to realize that we use the infinite to approximate the finite and not vice versa (This insight derives from conversations with Peter Huber, professor of statistics at MIT). In probability, for instance, we use the (continuous) normal distribution to approximate the (discrete) binomial distribution, though the normal distribution has far less claim on any concrete, real-world probabilistic situation than the binomial distribution. Our theories of physics and measurement both indicate that analog machines are not the way to understand reality at a fundamental level; below the atomic level matter is discrete, whereas the ubiquitous problem of measurement error implies that measurements can assign numbers only from a

finite set. For these reasons I hold that any machine has a finite state specification.

[30]Hellman and Thompson [1975: 555].

[31]Teller [1984: 137].

[32]Hellman and Thompson [1975: 555].

[33]Schiffer [1987: 153-154].

[34]Quoted from Parfit [1984: 200], emphasis added.

[35]Penrose [1989: 28].

[36]Cf. Quine's idea of a "web of belief" in Quine & Ullian [1978].

[37]Please note that I intend no slur by the designation *semi-materialism*. I introduce the term because I believe where a legitimate distinction exists a descriptive name is appropriate. Semi-materialism must be distinguished from what I have been calling the historic Judeo-Christian position on mind and body.

[38]See MacKay [1979]. Because his work has been so influential in evangelical circles, my criticism of semi-materialism will focus on the work of MacKay. His work, though widely cited in evangelical circles, tends to be accepted uncritically or left unchallenged (see Jones [1981: 265-270] and Emerson & Forbes [1989: 15]).

[39]MacKay [1979: 29-30].

[40]See MacKay [1979: 101], and compare his account there of death with such passages as John 11:26, John 6:63, Eph. 2:6, 2 Cor. 5:8, and Heb. 4:12.

[41]I am indebted to Stanley Jaki for drawing my attention to the incompatibility between the Incarnation and cognitive science. For a fuller account of this important theological argument see Jaki [1988: 110-111].

[42]Actually, for the present argument a locally finite universe is sufficient. Thus if a finite universe is disputed, the reader need only restrict his attention to planet earth where finiteness presents no problem. If the universe actually were infinite, a point physicists currently discount, then God, its creator, must be of a higher order infinity, so that his comprehension of such an infinite universe would entail no more difficulty than his comprehension of a finite universe. God's comprehension of any universe cannot be defective.

[43]The eyes of the LORD run to and fro throughout the whole earth, to show himself strong in the behalf of them whose heart is perfect toward him. [2 Chron. 16:9, KJV]

[44]Compare this with various interpretations of quantum mechanics for which randomness is fundamental.

[45]Evangelical Affirmations (14-17 May 1989).

[46]See the forward of MacKay [1979].

[47]Cf. 2 Cor. 4:18.

[48]Gn. 2:7.

[49]Rom. 8:10.

[50]Jas. 2:26.

[51]Augustine [ca.420: 362], *City of God*, XIII, 6.

[52]Aquinas [ca.1270: 379], *Summa Theologica*, I, 75, 2. Just before this passage Aquinas quotes Augustine from *De Trinitate* x, 7:

> Whoever understands that the nature of the soul is that of a substance and not that of a body, will see that those who maintain the corporeal nature of the soul are led astray through associating with the soul those things without which they are unable to think of any nature.

[53]Aquinas [ca.1270: 395], *Summa Theologica*, I, 76, 5.

[54]Quoted in Gunderson [1985: 8-9], emphasis added.

[55]See the Transcendental Aesthetic and the Second Analogy in Kant's *Critique of Pure Reason*.

[56]Wittgenstein [1958: §87].

[57]If the cognitive scientists could devise such a computer, I would, however, be loath to adopt semi-materialism. As I argued in the last section, semi-materialism entails a trivial and contemptible humanity. Within semi-materialism humanity becomes trivial just because it stands in contradistinction to such an exalted God.

[58]See Moravec [1988].

[59]See acknowledgements in Langton [1989].

[60]Semi-materialists may take some comfort in this fact, but as I have indicated in the appropriate section, they have problems of their own.

[61]Dembski [1990].

[62]Schank [1984: 13].

[63]See Schank [1984: 12].

[64]Heb. 3:3.

[65]It might be argued that because any super-duper computer (I would prefer simply to write "super computer," but this phrase is so overworked that an additional modifier is necessary) which puts us to shame intellectually will be the collective effort of countless scientists, there is no contradiction with the Law of Priority in Creation in saying that such a computer is more intelligent than any one individual. But if one admits this law, one must also admit that the collection of scientists who built the super-duper computer is more intelligent than the super-duper computer itself. Yet if the super-duper computer puts each scientist to shame individually, then it is true of the bunch. Here is a contradiction. The intelligence of a group of individuals is in fact only realized individually.

[66]*New Columbia Encyclopedia*, 4th ed., s.v. "alchemy."

[67]The last two paragraphs are adapted from the conclusion of Dembski [1989].

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The principle of simplicity, not to mention the virtue of humility, may again resolve the issue as it did for the founders of science: by recognizing that the order we perceive subsists in the mind of an active God rather than the "choices of nature" or the perceptions of man; by understanding that the startling design of the cosmos and of life is contingent upon the will of the Lord rather than our existence or upon matter having a soul; by returning to the point where, as astronomer Allan Sandage puts it, "Scientists can believe in order to understand."

A renewed metaphysics may finally allow science to come to terms with its origins after decades of official agnosticism. The "new science" may finally reveal a closer relationship between the Creator and his creation than mere mechanism had assumed. As T. S. Eliot prayed in the twentieth century: "We praise Thee, O God ... For all things exist only as seen by Thee, only as known by Thee, all things exist / only in Thy light."

—Bill Durbin Jr., *Christianity Today*, April 3, 1987

Hypocrisy and Wholeness: A Dialectical Puzzle and Paradox

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Religious hypocrisy is a major source of negative criticism in Christendom, but it has not been the subject of systematic research. Examples of pretending to be what one in fact is not are found throughout history. Hypocrisy has numerous social and psychological sources, many detrimental consequences, and some constructively functional results as well. Its solution lies not in lowering moral standards to fit the facts but in dealing wholesomely with the biblical reality that there are no "sinners emeritus." Sound theoretical and empirical research in numerous fields of the sciences and humanities will improve both our understanding and our Christian behavior.

Hypocrisy seems to be omnipresent in Christianity. It can be traced to events recorded in the New Testament and throughout history ever since. The scandals associated with Jim and Tammy Bakker, Jimmy Swaggart, Catholic priests who apparently contracted AIDS through homosexual behavior, and other Christians who have succumbed to the ubiquitous temptations of American society are merely recent exemplars of similar experiences as old as the history of humanity.

Christianity suffers as a result. The charge that "The church is not for me; it's too full of hypocrites" is so common that Meadow and Kahoe (1984:350) labeled it "the classic heretic's excuse." It still lies at the heart of much of the criticism that has made the church as a social institution "Protestantism's whipping-boy, on whom all resentments over the failures of private religion tend to be visited, even when the essential significance of the Church in the realm of religion has been denied" (Douglass, 1938:214). Critics of religious agencies and assailants of the Christian faith often imply that but one instance of hypocrisy outweighs thousands of acts of fidelity.

The concept of "hypocrisy" has a negative connotation in everyday discourse. Normatively, both the Old and New Testament clearly condemn the kinds of behavior typically included under its descriptions. Assuming, therefore, that it generally is undesirable, several questions emerge: Will it ever be possible to eliminate hypocrisy from Christianity? Is it desirable to try? Does good ever result from hypocritical behavior? Let us examine some of the definitions, examples, sources, consequences, and potential resolutions to this problem.

Definitions of Hypocrisy

The word *hypocrisy* is based upon play acting or impersonating someone else—pretending to be what one in fact is not. It is "The act of simulating qualities of personality, moral character, religious convictions or other beliefs which are not actually present in the person or persons assuming that false appearance" (Johnson, 1959:354; see Ellison, 1962). "The predominant usage is moralistic; thus the hypocrite is one who pretends to be good or upright when one really is not so" (Price, 1986).

Hypocrisy also can be defined as "That attitude by which one pretends to be holy or virtuous. It is a species of lying" (Nevins, 1965:280; Gilby, 1979), so hypocrites are "people of the lie" (Peck 1983). The New Testament useage includes "godlessness," supporting the Old Testament view "that hypocrisy is not so much duplicity or insincerity as impiety and disregard of God's law" (Hubbard, 1984). From a pastoral psychology perspective, hypocrisy is different from such other sins as theft, murder, and adultery, for "it is a *method* of dealing with sin which prevents a solution. In this sense it is the opposite of repentance and confession, and like other psychological defense mechanisms, it prevents one from facing reality objectively" (Belgum, 1967:312).

Redekop (1970:168) has labeled "the Christian who can pledge allegiance to Christ and totally disregard His teachings and His life" as "the curse of Christianity." That person is hypocritical for two reasons: The failure to recognize one's hypocrisy and the lack of sanctions in the religious group to prevent getting by with it (p. 169).

Examples of Hypocrisy

Hypocrisy is all around us in politics, business, industry, education, international affairs, sports, and every other area of human concern, not just in religion. It is a frequent theme of literature, the movies, and investigative reporting in the mass media. Washington, D. C., has been described as "a city lying in the gutter, wallowing in hypocrisy. It has become a bizarre sinkhole of character assassination and smirking self-righteousness. It will eagerly cast not only the first stone, but any other rocks it can lay its hands on" (Wall Street Journal, 1987). Psychiatrists devote much effort to uncovering hypocrisy in their patients' lives, although they strangely tend to deny the reality of sin. Faculty members reveal a "liberal hypocrisy" when they defend traditional values of academic freedom and tenure within the university but criticize the status quo outside it (Basu and Leighninger, 1978). Dissemblance and deceit are major problems in scientific research ethics (Broad and Wade, 1982; Emerson, 1983:253-311; Peck, 1983:208-209).

"Misrepresentation by affiliation" is present in every free nation. Whenever representatives of a denomination or congregation imply that all of its members adhere to its doctrines or sociopolitical resolutions, they misrepresent the facts. Sweden, for example, is supposedly a "Christian nation," for 98 percent of the population is affiliated with the Church of Sweden. Yet at least 13 percent consider themselves to be atheists or agnostics (Barrett, 1982:650), and many of the others are merely *namnkristna*, Christians in name only (Tomasson, 1970:85). A survey in a Stockholm suburb found that only 14 percent believed in the doctrines of God as Creator, Jesus as Savior, and the resurrection of the dead; 43 percent were agnostics and 17 percent atheists (Austin, 1968:169-170).

The founders of sectarian splinter groups often try to differentiate themselves from "heretical and hypocritical" parent bodies. Many avoid being labeled as a "church" for fear of guilt by association (Moberg, 1985:75, 273). For example, Black Jehovah's Witnesses criticize:

> ... the seeming greed for money, the round of social activities with little real religion being taught, the promises of a heaven after death without any help for the "here and now," the emotionalism of the "shake and shout" sects, and the hypocrisy of many church-goers. Preachers in particular are singled out for their worldly materialism and manipulation of their congregations.... Many of them are seen as hustlers who have a good religious racket going for them. ... Witnesses offer an alternative. There is no paid, local clergy. ... The Witnesses never take a collection at any of their meetings. ... There are no hypocrites in their ranks: anyone who breaks one of Society's divine laws is quickly purged ... by probation or "disfellowshipping" ... (Cooper, 1974: 716-717).

Yet hypocrisy is present even in sects that react against it. Once established, a new religion itself

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tends to become "hypocritical" as recruitment efforts bring in more people and the leadership copes with organizational demands and dilemmas, so the group may in turn become a source of sect members elsewhere (Moberg, 1985:118-122; O'Dea and Aviad, 1983:56-64). Although many of its adherents claim otherwise, secular humanism was declared by the Supreme Court to be a religion in its 1961 Torcaso v. Watkins case (see Kilpatrick, 1986), and many New Age groups advertise that they are "not a religion." Some sect leaders have privately admitted going into "the God racket" because it is the easiest way to make money (Berton, 1965:7). Sermons, glossolalia, and testimonies have been used by Pentecostal religious leaders to make and refute charges against each other (Martin, 1967:134).

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Hamilton (1973:226) believes the Christian pastor "can hardly do anything that will not tarnish the image of being a 'genuine' Christian." Commenting on Jesus' observation that it is impossible to escape a derogatory personal image (Luke 7:31-35), he indicates that even if every minister in the world were transformed into a perfect Christian, the negative images of inadequacy and hypocrisy would almost certainly continue (p. 227).

One of the most striking descriptions of hypocrisy is the novel, *Holy Masquerade* (Hartman, 1963), about a Swedish clergyman's "theatrical religiosity," "professional superciliousness," and pharisaism as seen by his wife. It vividly portrays the nuances by which right seems wrong and wrong right, as well as the linkage of mental illness and projection in accusations against others. "All a man's ways seem right to him, but the Lord weighs the heart" (Proverbs 21:1, NIV).

The harshest accusations of hypocrisy often flow out of internal self-criticism, for those inside a group's leadership structures are likely to know the most about questionable details of activity, belief, and personal behavior of others. Yet even observers with standards of a pagan society may expose faults that a church does not see in itself, as in I Corinthians 5:1-5.

Numerous charges of hypocrisy are made by various Christians against each other. Some examples of their targets are these:

—"the seductiveness of effectiveness" in the church growth movement by which "making disciples" takes priority over perfecting them (Evans, 1979:301-306);

—the tendency of many people to go through merely the motions of worship, kidding themselves that God demands only attending services, singing hymns, and busy involvement in "God's work" (Keith-Lucas, 1972:204);

—evangelistic outreach that offers words of God's love to individuals in need without any deeds to solve the structural problems of society that are a source of their problems;

—the tendency of social activists to salve their consciences by giving attention only to institutional evil and long-range collective goals, ignoring both the immediate needs and the eternal salvation of specific persons. "A supposed *social* conscience, then, becomes in reality an excuse for *personal* complacency" (Quebedeaux, 1974:94; see also Moberg, 1977:208, and Lewis, 1967:272);

—the reaction of radical Christians against cheap grace that eventually replaces God's grace with an idolatrous search for justification through a simple lifestyle, public protests, identity with the poor that makes capital out of their suffering, the nonviolence principle with its manipulative will to power, a radical prophetic identity that rests upon prooftexting no better than that of fundamentalists, and a tendency to protest oppression and persecution by imperialists but not by communists (Wallis, 1979; see also Skillen, 1986:30 on H. Richard Niebuhr's criticism of brother Reinhold's liberalism as "a first-aid to hypocrisy");

—attention to tangible human needs of others only when it is bait for evangelism (see Moberg, 1985:97-116).

..."Making disciples" takes priority over perfecting them.

Jesus condemned religious leaders for wearing masks of piety while greedily exploiting and misleading people, indulging themselves and using ceremonial purity to hide their sins (see especially Matthew 23). This is often linked to criticisms of the religious establishments of our day. Berton (1965:10-11, 100-101) calls attention to "the lukewarm pulpit" that makes hypocrites of its occupants and to "enlightened priests" who say that the words in the Anglican baptismal service that

"all men are conceived and born in sin" do not really mean what they seem to mean.

> But ... if that was what the Church really believed; if the passage ... meant something other than what it seemed to mean, why ... was not all this stated in the clearest possible English? If the priests of the Church themselves did not believe the literal truth of what they were saying, why were they required to say it? (pp. 10-11).

TV actor Michael Moriarty (reported by Marty, 1985) has described his Catholic Church as having "layers of contradictions. ... The Church is an image of humanity in its ugliness as well as beauty." Similarly, "The Church is something like Noah's ark. If it weren't for the storm outside, you couldn't stand the smell inside" (Allin, 1970:159). Yet people continue to enter and remain in that ark because it is better by far inside than outside.

"The Church is something like Noah's ark. If it weren't for the storm outside, you couldn't stand the smell inside."

Much of the anti-Christian bias among Marxists and other critics can be traced historically to hypocrisies in the linkages between church and state, to syncretistic and folk religions that make society rather than persons the locus of "faith," to goal displacement by the bureaucratic staffs of religious institutions, to the assumption that Christian identity is conferred simply through the "cheap grace" of sacramental rituals rather than by personal commitment to Jesus Christ, and to the accompanying extrinsic religiosity that battles an intrinsic Christian faith. Extrinsic religiousness has often contributed to abuses of "Christianity," including pogroms of unbelievers, enslavement or colonization of pagans, exploitation of the poor, devastating wars, and other evil deeds of rulers, exploiters, and nations wearing a "Christian" label.

> But sharper historians have observed that most of these so-called religious wars have resulted more from the greed of rulers, the egoism of fanaticists, the forces of economics, power politics and age-old hatreds. In many of them, religion has been a smokescreen and an excuse, rather than the root cause (Johnston, 1986).

Other examples of hypocritical behavior in churches are the public relations announcements about "a great victory" when two or three dying congregations are merged into one that still is marginal; the "selective Catholicism" that characterizes many staff members of Catholic agencies (Kelly, 1985); and the selectivity when demythologizing Scripture that makes many of the laity label religious leaders as "hypocrites."

Root Sources of Hypocrisy

Hypocrisy is a value-laden concept. It reflects tensions in a society which promises personal freedom and concern for well-being along with social welfare for the common good (Conover, 1967:33). An inevitable "hypocrisy" thus stems from society's moral code as regulative pressures for the collective good impinge upon the civil liberties of individuals. American society also makes possible more religious hypocrisy than most other countries; because it is easier to be religious, there is more spiritual mediocrity and many more apathetic members with little or no interest in important religious issues (Greeley, 1972:233).

"Hypocrisy" is a label we assign to others, seldom to ourselves. If we do notice our own foibles, failures, and faults, we find excuses and rationalizations for them. Yet they often are reflected in the projection by which we blame others for their sins. Many Christian groups tolerate internal sins of arrogance, gossip, envy, division into factions, selfishly materialistic lifestyles, and rejection of social deviants, even while they condemn similar failings of others as "dirty sins." Slippery conceptualizations manipulate our implicit operational definitions, with indignation at the conduct of others and justification for our own.

"Hypocrisy" is a label we assign to others, seldom to ourselves.

It is very difficult to analyze the motivations behind human conduct, for they are very complex, multifarious, and almost invariably not fully understood by even the acting person. Ulterior motives are especially hard to identify, for we are more moral in words than in deeds (Scott, 1971:117, 162). Everyone "marshalls more 'good' reasons for his sins than he does for his virtues!" (Rushdoony, 1986:2). Accusing others of hypocrisy often reflects the sin of pride, as if the accuser is blameless. Hypocritical actions often are defense mechanisms that conceal feelings, thoughts, and behavior that are inconsistent with one's idealizations and accom-

panied by the dishonesty of attempting to obscure them (Duncombe, 1969:98).

Hypocritical actions often are defense mechanisms that conceal feelings, thoughts, and behavior that are inconsistent with one's idealizations...

When hypocritical defense mechanisms are in danger of being exposed, a person becomes "cautious about all possible controversial utterances"; in contrast, the mature Christian has both "openness" and "ultimate honesty" (Duncombe, 1969:99-100). The immature tend to cling to an outmoded view of reality which is a basis for much mental illness, inappropriately transferring childish ways of perceiving and responding to the world into their adulthood. They are quick to identify others as hypocrites, liars, and cheats, reinforcing distrust and alienation from others in the interactive processes of social relationships (Peck, 1978:46-50). Hence diagnosis, the first step toward a cure, is itself afflicted. Hypocrisy may be an iatrogenic disease of religious institutions, therapy for it sometimes causing even more illness and disability than was present before treatment began.

Many adults condemn the inconsistencies of youth, but youth are even more ready to identify the parental generation's failures to practice what they preach (see Lederach, 1971:51-52). The newly acquired capacity of adolescents to express ideals, alongside of their inability to recognize the practical difficulties in trying to apply all ideals to concrete behavior (Elkind, 1978; see Deutscher, 1973), may be part of the reason why adolescence is the preadult stage most filled with hypocrisy (Mitchell, 1980). The conviction that religion is "all a big pretense and they're all a bunch of hypocrites" is so common among college age youth that LaBarre (1969:131) considers it to be normal. It is one of the overt reasons for revolting against established churches by joining groups like the Hare Krishna (Judah, 1974:464, 475).

The discrepancies between competing ideals and the impossibility to apply all of them equally and simultaneously may be part of the reason for the stereotyped "bad guy" image of PKs (preachers' kids). When added to the criticisms that flow from the public nature of life in most pastors' families, this can be very disturbing to sensitive youths. Children of active lay members similarly tend to rebel and fall away from their parents' faith. "They can see the hypocrisy, the inconsistency, and the prejudice in their parents' lives. Unhappily, they then tend to equate these with the church, and in rejecting their parents' faith they also reject Christ in their own lives" (Hyder,1971:96).

A widespread cause of unbelief in American society is the cultural conformity of the church and its consequent ethical paralysis and hypocrisy. Civil religion becomes a religious cover for destructive impulses of the nation (Wallis, 1976:41,44).

Public opinion surveys demonstrate that substantial proportions of Catholics and Protestants deviate from the views of their church on such issues as abortion, contraception, marriage of priests, women as clergy, and topics related to social policy. Major reasons for the discrepancy between the "official religion" and their "operant faith" include how the person has been socialized into the official model, incorrect or incomplete knowledge of the official belief, inadequate internalization, overlayment of the official model with other religious themes, variations in expectations of consistency, deviation in priorities, outright disagreement, and allowable levels of nonconformity (McGuire, 1981:78-80).

The pick-and-choose mentality of "cafeteria Christians" who decide for themselves which of the doctrines and behavior guidelines of their church to accept and which to reject may be interpreted as either hypocrisy or as courageous implementation of soul liberty and religious freedom. This "selective Catholicism" has been documented among staff members of Catholic Charities agencies, as well as among American Catholics at large (Kelly, 1985).

The pick-and-choose mentality of "cafeteria Christians" ... may be interpreted as either hypocrisy or as courageous implementation of soul liberty and religious freedom.

The naiveté of believing there are simple unidimensional solutions to complex social issues is one of the sources of contradictory social policy positions which other Christians condemn as heretical. So also is the tendency to adopt a political position first, only later seeking its religious justification, in contrast to being solidly grounded first in relevant ethical values that genuinely flow from the faith.

Exposed selectively to those portions of the mass media that are biased by a socioeconomic ideology that they agree with, and given relatively little explicitly Christian input on most social issues, the selective information process enables Christians to find allegedly "biblical" support for any predetermined stance and then, like other citizens, to ignore all contrary perspectives. Then in political campaigning they view their side as purely "Christian" and their opponents' as hypocritical or heretical. They also may become hypocrites through compartmentalization, living as if religion is separate from other areas of life (Dunn et al., 1981:117).

The question of who is a "genuine Christian" is compounded by the wide diversity of definitions. Barrett (1982:70-72, 850-852) has classified the types of Christians worldwide into more than twenty-five broad categories, within each of which are numerous churches, sects, and denominations. Each of these, in turn, has many informal subdivisions with their own values, each finding it easy to describe others as "hypocrites" or "not really Christians at all." This in turn is closely related to diverse conceptualizations of the church and its relationship to the world, a topic addressed by Shippey (1963) and reflected in Troeltsch's expositions of the history of Christianity as one of compromises with its context (Shippey, 1971:41).

The question of who is a "genuine Christian" is compounded by the wide diversity of definitions.

Pragmatic operational definitions of hypocrisy are likewise linked with basic theological issues. The manner and extent to which the Bible is accepted as normative, questions about its interpretation, and preferred ways of dealing with clashes of such values as love and justice in complex pragmatic issues lie behind many charges of hypocrisy. Hence it is easy for Christians trying to apply ethical values to social issues to disagree with one another and for church members to hold positions at variance with official declarations of their denominations (Hero, 1970).

In addition, efforts oriented toward any one social issue tend to preclude action on dozens of others because resources of personnel, time, and finances are scarce. When every morning "a thousand human needs beckon within walking distance of your own home; millions more beyond your immediate neighborhood, throughout the nation and the world," one can address but a fraction of them (Christenson, 1974:21-22). Contrasts between "social activists" and "evangelicals" often can be seen best as those of different priorities and methodologies, rather than of social involvement versus non-involvement. "The essential difference ... is not over *whether* we should become involved in society, but over *where* and *how* we should become involved" (p. 23). We have no choice other than to be selective, letting many options pass in order to work on a few. Both liberals and conservatives need to learn that it is hypocritical to draw up a narrow list of social issues and proclaim that it alone is the valid set of current concerns for all Christians.

Both liberals and conservatives need to learn that it is hypocritical to draw up a narrow list of social issues and proclaim that it alone is the valid set of current concerns for all Christians.

To discern when allegations of hypocrisy have valid grounds is not easy. The Bible reminds us of its root causes in the deceitfulness of sin (Romans 7:11; Hebrews 3:13), which includes the deceptions of wealth (Matthew 13:22), the love of money (I Timothy 6:10), false witnesses (Proverbs 14:25), charm and beauty (Proverbs 31:30), lying lips and deceitful tongues (Psalm 120:2-3), people who masquerade as apostles of Christ or angels of light (II Corinthians 11:13-15), false prophets and false christs (Matthew 24:5, 11, 24), evil men and impostors (II Timothy 3:13), wine and beer (Proverbs 20:1), human desires (Ephesians 4:22), flattery (Romans 16:18), and empty words (Ephesians 5:6), to mention only some of the sources of delusion. These obviously can be related to the materialism, individualism, moral relativism, hedonism, and narcissism of contemporary society, as well as to the traditional "seven deadly sins" (see Lyman, 1978; Moberg, 1985). Not least among the sources is the human tendency to delude ourselves regarding moral and spiritual issues (I Corinthians 3:18; James 1:22; I John 1:8), for "The heart is deceitful above all things and beyond cure. Who can understand it?" (Jeremiah 17:9, NIV). Improved discernment and understanding of the complex issues related to hypocrisy pose a significant challenge for sociologists of Christianity as well as for psychologists, ethicists, and theologians.

SEARCH

Scientists Who Serve God

A Born Biology Teacher

Marilyne Sally Flora of Batavia, Illinois, is a "born teacher" who loves biology and loves teaching it, currently to students in an anatomy and physiology class at Judson College, a general biology class at Elgin Community College, and an environmental biology class at Waubonsee Community College. She has also made another kind of contribution to science education. As part of a family-run company called Intelitool, she has helped provide computer-interfaced equipment to give students "hands-on" laboratory experience.

Off to a Good Start—at the Bronx Zoo

Marilyne Freeman was born in New York City and through the fifth grade lived near the famous Bronx Zoo. She was an early reader but credits her interest in biology and in science in general to "hanging out" at the zoo as a child (on the two days a week with no admission charge). One of her earliest childhood memories is of being wheeled past the animal cages in a baby carriage. She also remembers the cultural richness of growing up in an Italian family in a predominantly Jewish neighborhood. Sundays meant big family dinners at Grandma's house. Marilyne's maternal grandparents had come to America via Ellis Island as immigrants from Sicily.

With a Protestant name from her father but a Roman Catholic extended family, Marilyne gained an early appreciation of religious diversity. ("We worship the same God," her mother would say.) Participating in Sunday school classes and other activities at a Presbyterian church gave Marilyne a head start at school. Instead of playing with dolls she was often "playing school" with her friends. When her immediate family moved to a semi-rural setting in New York's Hudson Valley, her father continued to commute to his Manhattan bookkeeping job but Marilyne had room to roam as a tomboy and keep ahead of her two younger brothers.

College and Beyond

In high school Marilyne was active in various clubs but made top grades in math by always double-checking her work. She began commuting to the college nearest home, at New Paltz, part of the New York State University system. One quarter she lived on campus and discovered the Inter-Varsity Christian Fellowship group, where she met Bob Flora, campus instrument technician. Bob received his M.S. in physics at nearby Clarkson College in 1967, the year Marilyne received her B.S. in biology education. The next year they married—spending part of their honeymoon finishing up Bob's thesis.

Marilyne and Bob moved to Illinois, where she did some graduate work at Wheaton College and earned an M.S. in biological sciences at the U. of I. at Chicago while Bob taught physics. After a brief return to New York, they settled down in Illinois when Bob became a physicist at the Fermi National Accelerator Lab in Batavia. They built a house there, doing much of the work themselves while raising daughters Linnann and Lisa, with Marilyne finding teaching jobs and baby sitters wherever she could. Then, with several other family members including Bob's brother Stephen (who is also both a biology teacher and a Christian), the Floras founded Intelitool, Inc.

It hasn't always been easy being wife, mother, teacher, and factotum of a new business enterprise—all at the same time. Marilyne Flora has had enough energy, and enough of God's grace, to pull it off, but sometimes it must have felt like running a zoo. Ω

Scientific Investigation

Providing Tools For Teachers

Until the 1950s, medical students and graduate students taking experimental physiology left grubby fingerprints everywhere. The standard device for recording data in those days was a rotating drum with a glossy paper sleeve that first had to be "smoked" in a sooty flame. A stylus that moved with each heartbeat or other parameter being measured traced a white line on the smoked drum. Spraying with shellac was the only way to preserve such records.

New Technology to the Rescue

In the "electronic age" after World War II, more sophisticated instruments with pen-and-ink recorders began showing up in physiology labs. Teachers and students could focus on the experiment itself instead of fussing with cranky data-recording equipment. But expensive "physiographs" were out of reach for high school labs and even for most colleges.

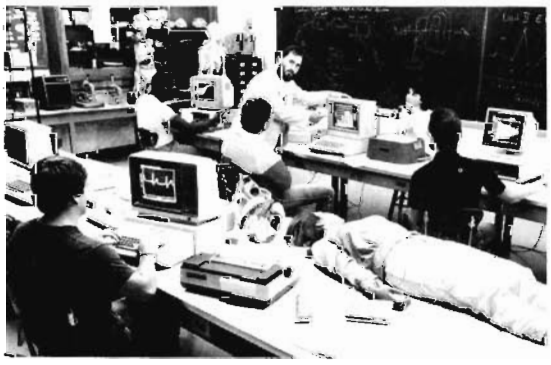
The tiny transistor that replaced the vacuum tube made possible new kinds of electronic "transducers." A transducer is a device for converting one kind of energy (such as the mechanical energy of a heartbeat) into another (such as an electrical voltage). Then the printed circuit board drastically reduced the size of electronic devices and ushered in the "computer age." By the late 1980s, personal microcomputers were everywhere and most schools had at least one "Apple" or "IBM compatible."

Fitting Human Physiology into the Budget

On Thanksgiving Day in 1982, after a big family dinner in the Flora home, the conversation turned to teaching and the need for better lab equipment in schools. The whole family was drawn in: Marilyne and her physicist husband Bob, Bob's brother Steve, and Bob's sister Hollie and her husband Alan. Alan had an M.S. in computer science, Hollie had managed a bookstore, and Steve, with an M.S. in biology, was a self-taught programming "whiz." Henry, family "patriarch" and a retired IBM executive with an M.B.A., encouraged them to turn their ideas into reality, and before long, Intelitool, Inc., was born. Each had something to contribute. Steve began designing and engineering affordable equipment while the rest learned how to run a business.

Intelitool's first product, the Physiogrip, came on the market in 1984. It enables students to measure fatigue, contraction, and other muscle phenomena on their own bodies. Other equipment followed: Cardiocomp for studying cardiac electrophysiology; Spirocomp for respiratory physiology; Flexicomp for reflex systems; Intelipulse, the latest, for pulse monitoring. All are cost-effective and designed for use with a standard microcomputer already in the lab. The experimental data go directly into the computer; software supplied with the device enables students to analyze the data in various ways. Students get a taste of how research is actually done.

Intelitool products are now in use in over 30 percent of the nation's colleges and in many high schools. Marilyne Flora temporarily left teaching to answer Intelitool's phone, take orders, help design ads for journals like the *American Biology Teacher,* demonstrate new products at NABT conventions, and do whatever was needed. Now she's back in the classroom. At the least sign of interest, however, she'll hook you up to a Cardiocomp and show you what your EKG looks like. Ω



INTELITOOL

The Intelitool series at work in a biology classroom. Intelitool says it is developing a full slate of new physiology instruments for classroom use.

COMPUTERS IN THE LAB

Good scientists generally have lots of ideas. Some of their ideas make sense and a few lead to "breakthroughs." Since it can take a lot of tedious work to see whether an idea is worth pursuing, laboratories that can obtain and analyze data efficiently are more likely to make important discoveries.

Every research scientist knows the value of a good laboratory assistant. Today computers have become amazingly useful assistants. In research labs they were first used for the same kinds of tasks as in business: writing letters and reports; keeping track of student records, grant funds, equipment, and supplies; and looking up information stored in "data banks."

Today laboratory computers are almost a necessity in both theoretical and experimental work. On the theoretical side, computer-generated "models" are used to test mathematical equations and to visualize complex chemical structures. In experimental work, computers are hooked up to all sorts of instruments to "input" and process data directly instead of recording data points by hand and then analyzing them with a calculator.

Even high school students can experience this modern way of doing science. To learn more about computerized instrumentation for physiology, contact Intelitool, Inc., P.O. Box 459, Batavia, IL 60510-0459. (Tel. 1-800-227-3805)

Science is sometimes divided into "pure" and "applied" areas, based on the presumed motivations of researchers. Pure scientists seek to understand the natural world; applied scientists seek solutions to human problems. Applied science undergirds technology—the actual production of useful objects.

The three areas are closely related. It has been argued that instead of calling technology the most applied kind of science, science should be thought of as "the purest technology." That's one way of reminding scientists that a technical description of nature isn't a complete understanding. What science is *good* for is producing a better scientific description—on which a more efficient technology can be based. In the other direction, ability to do pure research depends on the "state of the art" of high technology, for things like scientific instruments and computers.

Pure and Applied Christianity

The Christian community knows a similar division. Some Christians seek a clear understanding of God's word; others seek to apply that Word to the needs of suffering people. Religious institutions tend to take over ministry the way private business and government dominate the technological scene. Things can get complicated, even messy, and theological explorations can't always be kept under control.

As in the technical world, though, the different aspects are interrelated. Some Christians want to "stick to the Bible." Yet without the risks taken by churches, and missions, in the world, they might not have had the Bible. Christian thinkers depend on those who have "made something" of the faith, just as scientists depend on commercially available equipment.

The Right Tools for the Task

Like science, Christianity has not only its divisions but its specialists, requiring special "tools of the trade." For medical mission work, Christians need full training in medicine and often specialization beyond that. High-level study of theology requires fluency in Hebrew and Greek. Some biblical scholars now analyze biblical texts the way scientists analyze laboratory data—using computers.

Most of Jesus' followers, however, will always be "general purpose" Christians, equipped directly by the Holy Spirit's activity in their lives. A familiar passage in Ephesians 6 deals with that equipment in the military language of the first century. Behind the metaphorical breastplates, shields, helmets, and so on, is a check-off list of spiritual tools for functioning Christians of any era: truth; righteousness; the gospel of peace; faith; knowledge of one's salvation; "the sword of the Spirit, which is the word of God" (v. 17); prayer; and perseverance.

In Christian service, "state of the heart" matters more than "state of the art." Ω

Marilyne's brother-in-law, Stephen Flora, programming software to accompany Intelitool data-acquisition and analysis hardware. Intelitool sales have increased 20 to 30 percent per year since it introduced its first product in 1984. Over 3,200 Intelitool units have been sold to colleges and universities in the USA, with some sales overseas.

Theological Reflection

Getting Down to Business

A NATION AT RISK

Since publication of the 1983 report, *A Nation at Risk,* dozens of studies have continued to bring to light the dismal state of education in the United States. Some fundamental needs can be summarized as follows:

1. Students need an atmosphere of *trust.* Learning is most effective when young people feel physically safe and emotionally secure. They need to believe that teachers and school administrators are concerned about their welfare. They need confidence that they will be treated with respect by teachers who model self-respect. Teachers must be trustworthy and be held accountable for that trust.

2. Students need to experience a realistic *hope* of bettering themselves and their life situations. They need to know that education will do them some good, allowing them to do important things they could not do otherwise. Hope is especially important for minority students marginalized by society.

3. Students need teachers who *love* the young people in their classes, love to teach, and love the subject matter they're trying to get students to learn.

Trust (faith), *hope,* and *love?* Sound familiar? Without a revival of these qualities, schools will continue to decline and teaching will remain ineffective. Many science teachers need to know their subjects better, but the study of science alone cannot generate spiritual qualities.

Intelitool, Inc., began with its office in a room in Hollie's house, its shop in Steve's garage, and everybody pitching in to mail out the first advertising flyers by hand. Such a pattern was more common in earlier times, when families were basic economic units as well as basic social units for passing on both biological and cultural heritage.

The Importance of Families

Whatever the shortcomings of the American educational system, our schools are being blamed for something that is not their fault. Many children are simply not ready to learn science, or anything else, because they come from families that no longer live up to their educational responsibilities. Children who learn self-esteem and social relatedness within the security of a loving family are more likely to enter school eager to absorb the knowledge and skills that schools can teach.

Intelitool "extended family"; Bob & Marilyne back row, center.

Many children have been cheated at home, and our country is beginning to suffer the consequences. To Christians the tragedy is even deeper because the Bible uses so much family imagery. Its primary picture of God's relationship to his people is the parent-child relationship. God is *Our Father* not merely in "the Lord's prayer" (Matthew 6:9-13) but throughout. In a vicious cycle, adults rejecting the biblical message may model parenthood in ways that keep children from believing in the heavenly Father's love for them. What kind of parents will *they* become?

One Big Family of Believers

In the New Testament, accepting the gospel is compared to adoption (Romans 8:15; Ephesians 1:5), giving hope of breaking an endless cycle of parents and offspring letting each other down. Jesus Christ offers "sanctuary" in a wholesome surrogate family—an international, intercultural, eternal family of believers. Any unloved child or cynical adult can be redeemed by Christ's forgiving love, to start a new cycle spiraling upward instead of downward. One's new "brothers and sisters" won't be all they should be, since their lives are also scarred, but the *promise* is there of a caring family.

Marilyne Flora has found her place in that larger family. She knows that Christians are divided on some issues, and has survived at least one bad experience. For four years she taught at a Christian high school where some parents insisted on a "young earth" interpretation of Genesis 1. Despite her own example of showing tolerance for various viewpoints, when she introduced her students to a broader range of Christian positions, she lost her job.

A "fellowship of kindred minds" in the American Scientific Affiliation has meant a lot to Marilyne. Brother-in-law Steve Flora is also a member. ASA brings together several thousand evangelical Christians for whom scientific work, including science teaching, is a way of serving Christ. In 1990, a new "branch of the family" was formed, the Affiliation of Christian Biologists, with Marilyne Flora as one of its officers. "It's a great bunch of people," she says. (Interested biologists can contact ACB c/o ASA, address at right.)

> *But when the fullness of time had come, God sent his Son . . . so that we might receive adoption as children. And because you are children, God has sent the Spirit of his Son into our hearts, crying, "Abba! Father!" So you are no longer a slave but a child, and if a child then also an heir, through God.*
> (Galatians 4:4-7)

Ω

Thoughtful Worship

Family Enterprise

SEARCH

This issue of SEARCH (No. 11) was prepared by Walter R. Hearn of Berkeley, California. Design by Nancy C. Hanger; layout by ASA managing editor Rebecca Petersen. Opinions expressed in SEARCH are those of individuals and may not be representative of the entire ASA membership. Scripture quotations are from the New Revised Standard Version (1989) unless otherwise noted.

SEARCH brings scientific questions to the attention of pastors and the Christian public by focusing on the work of Christians in science. SEARCH is an occasional publication of the American Scientific Affiliation (ASA), Robert L. Herrmann, executive director. To obtain a free single copy, send stamped, self-addressed envelope to: ASA, P.O. Box 668, Ipswich, MA 01938. Be sure to state the number of the issue being requested. Multiple copies to one address: 15 cents/copy plus $1.50 postage and handling charge; prepaid orders only, please.

The 1989 version of ASA's 48-page guidebook, *Teaching Science in a Climate of Controversy,* helps teachers cope with questions of science and religion. It is available postpaid from ASA at $6 for one copy, $5 each for 2-9 copies, $4 each for 10 or more copies.

For information on ASA Annual Meetings, other ASA publications, or how to become a **Member**, **Associate**, or **Friend** of ASA, write to: **ASA, P.O. Box 668, Ipswich, MA 01938.**

Detrimental Consequences of Hypocrisy

Most of the observed results of hypocrisy are negative. We have already alluded to its contributions to the reasons and rationalizations for disaffiliation and refusal to participate in church life, the formation and growth of sects and cults, inappropriate methods for dealing with sin, uncomplimentary images of Christianity and its clergy, internal church conflicts, the cultural entrapment and misuse of religious institutions, unChristian acts by "Christians," and the distortion of church goals and objectives.

Many of the differences among Christians are a product of paradoxical, dialectically contrasting values that emerge from diverse hermeneutical and exegetical approaches to the Bible. Others flow from disagreements over matters of fact, their policy implications, and priorities for action. The struggles get so intense that many Christians throw up their hands in a do-nothing posture, fearing that no matter what action they take, some fellow Christians will criticize them for being heretical, hypocritical, or self-seeking opportunists (see Moberg, 1985). Their negligence takes the form of silence and inaction in the face of evil, injustice, and the worship of such false gods as the status quo or the golden calf of the hallowed economic motive (Fox, 1971:417).

The struggles get so intense that many Christians throw up their hands in a do-nothing posture, fearing that no matter what action they take, some fellow Christians will criticize them for being hypocritical...

People's ideals usually exceed their performance. We expect less discrepancy among those with strong than those with weak Christian commitment and among those who have been committed for longer periods of time. Paradoxically, if depth and length of commitment lead to higher aspirations and ideals, the subjectively perceived discrepancies may become greater as commitment increases in intensity and duration, making people feel more "hypocritical" as they in fact become more mature.

Neuroses can result from contrasting one's private with one's public appearances and from emotive shocks to children who are sensitive to what seem to be hypocritical contradictions of parents trying to satisfy the public demands of religious, moral, or social formalism under the fear of "what people will say" (Tournier, 1966:61-65). "Every discord between form and substance, between what others see and the reality of the heart, is a denial of the Gospel and can only be a source of psychological trouble" (p. 65).

What some Christians regard as virtues may actually poison spiritual growth. The worst of behavior can spring from noble motives.

Sometimes a person may feel ashamed of a well-intentioned honest act because the context conveys false impressions. The resulting defensive maneuvers then may be identical to those of one who is genuinely guilty, resulting in alienation from oneself and increased wariness and suspicion of other people (Goffman, 1959:236-237). Guilt feelings, false guilt, and shame are interwoven with the "normal" processes of everyday life as well as with hypocrisy (see Belgum, 1963, and Lynd, 1958).

What some Christians regard as virtues may actually poison spiritual growth. The worst of behavior can spring from noble motives. Censoriousness, permissiveness, childishness, exhibitionism, and other flaws sometimes masquerade beneath hypocritical piety (Mann, 1979).

Wholesome Consequences of Hypocrisy

Surprisingly, many of the results of hypocrisy and closely related phenomena are constructive. A major conclusion of the perceptive analyses of deceit collected by Mitchell and Thompson (1986) is that "deception is ubiquitous in human interaction" (p. 267). It is evident in children's games, feints and ruses in sports, bearing up under losses, camouflage and deception in warfare, placebos in medical research, play-acting, magic tricks, and many other activities. It is probable that social life as we know it would be impossible without various approved forms of deceptiveness and coverups. Constructive deceit depends considerably upon the predictability of the victims' responses, so it "works within the context of honesty" (p. 358). Hence Freudians view hypocrisy as "a precious thing .... Like reticience,

it may help build up those habits of avoidance that swerve us from honest, but head-on, collisions with one another" (Rieff, 1966:57).

Goffman (1967), for example, has called attention to the "face-work" by which a person defends a self-image delineated in terms of social attributes that are approved by significant others. Some are willing to put on an act in a desire to achieve something that follows, but no society could persist very long if its members did not approve and foster integrity (p. 219). In masterful discussions of the presentation of self in everyday life, Goffman (1959) deals with many processes directly relevant to hypocrisy, although he does not use that word. Among these are the information game with its "infinite cycle" of concealment, discovery, false revelation, and rediscovery (pp. 8-9); the significance of the word *person* in its first meaning as a mask people wear for their roles in "careers of faith" that move back and forth between sincerity and cynicism on the stage of life (pp. 19-20); idealizations offered observers through impression management (pp. 34-51); the misrepresentation of using signs to attest to the presence of something not really there, including the "white lies" of doctors or of guests and the concealing of practices incompatible with publicly fostered impressions in every vocation (pp. 58-66); secrets kept from its audience by a team of actors (pp. 141-144); and the roles of informer, shill, protective agent, professional shopper, and mediator that bring in a person with a false guise (pp. 145-151). His skillful examples of taken-for-granted realities in everyday life reveal the pervasiveness of behavior many people would label as "hypocritical," much of which contributes to the smooth functioning of society.

Because various forms of deception are essential "lubricants" of social life, society has been described a bit too harshly as "a network of lies and deception."

These little hypocrisies often facilitate social relationships through rules of etiquette and conventions of politeness. Because various forms of deception are essential "lubricants" of social life, society has been described a bit too harshly as "a network of lies and deception" (Alexander, 1975:96; see Anderson, 1986:335, and Goleman, 1985). A basic trust, truthfulness, and sincerity is the criterion for identifying lies, and it is also essential to social order (Lewis and Weigert, 1985). In a sense there is true deception only when a message sender believes the message to be false (Vasek, 1986:272.)

Solutions and Responses to Hypocrisy

The temptation to reduce hypocrisy by lowering moral standards in order to make ideals fit reality is an option often chosen by our society. In effect that makes actual behavior the ultimate criterion of right and wrong. Is it not "far better to profess the truth and fail to live it than not to profess it at all" (Hitchcock, 1983:32; see Greeley, 1972:173)?

Because hypocrisy has both destructive and constructive consequences, thinking people continually face dilemmas, either horn of which contains its own evil but also its own good.

Because hypocrisy has both destructive and constructive consequences, thinking people continually face dilemmas, either horn of which contains its own evil but also its own good. The dialectical interplay between seeing all human beings as sinners and yet all as created in the image of God is linked with the issue of hypocrisy. Even committed Christians—the apostolically designated saints—are still sinners, as the bumper sticker reminds us: CHRISTIANS AREN'T PERFECT, JUST FORGIVEN.

Significantly, "A hypocrite is someone who says he believes one thing but lives another. By that standard, ... there is no one who claims to be a Christian who is not in one sense a hypocrite" (Yancey and Stafford, 1979:152). A major source of accusations of hypocrisy against many fundamentalist Christians is their use of the past tense with respect to sinfulness, as if their status of "righteousness in Christ" means that they no longer sin. The Bible's message to them and all others is clear: "If we claim to be without sin, we deceive ourselves and the truth is not in us" (I John 1:8, NIV).

There are no "sinners emeritus" (Larson, 1984). Christians must more openly acknowledge that we are still on a pilgrimage toward perfection; none

among us finally arrives during this life on earth. Nobody conforms completely to all the ideals of Christianity, even when we consistently strive toward that goal.

> The cleansing of the inner motives of religious teaching and practice is a spiritual exercise continually demanded by the prophets, the apostles, and Jesus himself. ... Jesus' mind was passionately in love with reality and abhorred the circuitous deceptiveness characteristic of much religious behavior. He knew the unlimited capacity of the human mind for self-deception as well as its capacity for reality (Oates, 1955:viii, 32).

Remember that it was "the nice people who stood high in the community" (Sheen, 1967:235) who crucified Jesus. They could not tolerate his reproaches of their hypocritical inconsistencies and his demands for their change of heart. "The gravest error of the *nice* people in all ages is denial of sin. ... *Nice* people must see themselves as nasty people before they can find peace" (pp. 236, 239). Only by being open to oneself and to someone else can one's hypocritical mask or facade be stripped away (see Lindquist, 1983:69-82, and Farnsworth, 1985:103).

As we observe Christians who appear to be hypocrites, we can follow the example of the Apostle Paul and rejoice even in our sadness whenever they nevertheless proclaim Jesus Christ (Philippians 1:15-18). The admonition of Jesus is very pertinent, "Do not judge, or you too will be judged. For in the same way you judge others, you will be judged" (Matthew 7:1-2, NIV).

Remember that it was "the nice people who stood high in the community" who crucified Jesus.

Unfortunate and misguided as much judgment of other people and groups is, its baneful effects are aggravated when subcultural or sectarian criteria relevant to one social environment, role, or set of circumstances are applied willy-nilly to all others. Contextualization of biblical principles is a significant issue within our own culture just as much as it is across the boundaries between nations and people groups.

In his analysis of what liberals and fundamentalists have in common, Inbody (1984) cautions his fellow liberals to repent as sinners needing forgiveness for their self-deceptions and false pride in order to transcend their situation and live up to their ideals. Of course, that need goes in both directions. Both should genuinely listen to each other, for thereby flaws found in each camp can be corrected.

Whether it is possible to transform extrinsic Christian hypocrites into genuinely intrinsic Christians by any method short of spiritual conversion is an open question. Wallis (1981:29) "once thought that the gulf between what the Scriptures say and how Christians live was simply the result of self-interest and hypocrisy." More recently he concluded that contradictions in the church's life result from the lack of faith, which is the source of both spiritual lukewarmness and political conformity to destructive social arrangements. Many "hypocrites in the church" are sincere in their faith but have personal and social inadequacies not easily solved by superficial religious activities (Moberg, 1984:365; see Demerath, 1965:28).

"The mask we wear decides the possibilities we seek for ourselves, and determines what we will attempt to do or become. We actually become the mask, or grow toward becoming it."

The role playing of daily life requires constant changing of our masks in order to adapt to different situations, each of which has its own expectations, demands, rules, and sanctions (see Johnston, 1985:105-119). We can and do choose many of the masks we wear, as well as their qualities. Besides, "The mask we wear decides the possibilities we seek for ourselves, and determines what we will attempt to do or become. We actually become the mask, or grow toward becoming it" (Elliott, 1987:1-2).

Sometimes "little hypocrisies" are necessary not only to simplify and expedite our daily patterns of social interaction by socially sanctioned etiquette, but even to do God's work more effectively. The example of the Apostle Paul includes being "all things to all men," i. e., putting on various masks and taking diverse roles, in order to win as many as possible to faith in Jesus Christ and to advance the gospel (I Corinthians 9:19-23). Yet such activities ought never to harm others, for evil deeds are not justified by good results (Romans 3:7-8).

The ultimate Christian solution to the negative aspects of hypocrisy is the imitation of Jesus Christ.

He alone lived a sinless life (Hebrews 4:15), even though he was surrounded by temptations and deceitful institutional practices, just as we are. It is he, not ourselves nor any other person or agency, that must be exalted as the wholly perfect, completely upright model to emulate and person to follow.

The label of "Christian" implies "miniature Christ." Wearing that mask means living *as if* we love everyone, even the "unlovable," then in the process growing actually to love them. Clothing ourselves in the new garments of His righteousness, we become ever more like Him in mind and deed.

Conclusions

Defined most simply as pretending to be holy or virtuous when one really is not, hypocrisy and selective indignation against it are widespread in human society. In spite of its importance as a continually appearing phenomenon in religious institutions and as a charge brought against churches by their critics, it has received little attention in the sociology of Christianity. We need a clearer conceptual, empirical, theoretical, and pragmatic understanding of the subject and how to deal with it. This demands the triangulation of research from numerous disciplines, including history, literature, journalism, philosophy, economics, psychology, medicine, anthropology, political science, sociology, theology, and religious studies. (For an introduction to some aspects of this subject see Moberg, 1987.)

Those whose hypocrisies are exposed tend to attack the exposers, so such work inevitably faces opposition and criticism far more severe than is typical of research on most topics. Much of the ammunition for their attacks will be provided by our own abundant flaws, but they will be harmless if we have already openly confessed our sins and dealt with our hypocrisies in the context of a community of faith.

To observe a phenomenon is to change it. Although the church may always remain a "whipping-boy" to its critics, a sound research approach to hypocrisy will help to strip off many of the harmful masks of "holy masquerades." It will correct many mistakes, test alternative solutions, and replace stereotyped biases with more balanced understandings of the dialectical interplay between the destructive and constructive aspects of hypocritical behavior. It also will contribute to the humility of recognizing our own inconsistencies, make us less indignant and more empathetic toward other Christians, and thus help us to move toward the total well-being or shalom of a genuinely wholistic Christianity (see Moberg, 1985, and especially the Bible). ❄

ACKNOWLEDGEMENTS

This is a slightly modified version of the first of two inaugural Frederick Alexander Shippey Lectures in the Sociology of Christianity on "Spiritual Well-Being and Wholistic Christianity" at the Theological School, Drew University, Madison, New Jersey, October 26, 1988. Portions are adapted from an H. Paul Douglass Lecture (Moberg, 1987) and from a presentation on "Religious Hypocrisy: A Bone of Contention in the Christian Family, or Conflict in Christendom," at the annual meeting of the American Scientific Affiliation, Pepperdine University, Malibu, California, August 8, 1988. The other Shippey Lecture, "Spiritual Well-Being and Shalom," will be published in a forthcoming issue of *Science and Christian Belief.*

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St. Augustine on Creationists

Usually, even a non-Christian knows something about the earth, the heavens, and the other elements of this world, about the motion and orbit of the stars and even their size and relative positions, about the predictable eclipses of the sun and moon, the cycles of the years and the seasons, about the kinds of animals, shrubs, stones and so forth, and this knowledge he holds to as being certain from reason and experience.

Now, it is a disgraceful and dangerous thing for an infidel to hear a Christian, while presumably giving the meaning of Holy Scripture, talking nonsense on these topics. We should take all means to prevent such an embarrassing situation, in which people show up vast ignorance in a Christian and laugh it to scorn. The shame is not so much that an ignorant individual is derided, but that people outside the household of the Faith think that our sacred writers also held such opinions, and (to the great loss of those for whose salvation we toil), the writers of our Scripture are criticized and rejected as unlearned men.

If they find a Christian mistaken in a field which they themselves know well, and hear him maintaining his foolish opinions about the Scriptures, how then are they going to believe those Scriptures in matters concerning the resurrection of the dead, the hope of eternal life, and the kingdom of heaven? How indeed, when they think that their pages are full of falsehoods on facts which they themselves have learnt from experience and the light of reason?

Reckless and incompetent expounders of Holy Scripture bring untold trouble and sorrow on their wiser brethren when they are caught in one of their mischievous false opinions, and are taken to task by those who are not bound by the authority of our sacred books. For then, to defend their utterly foolish and obviously untrue statements, they will try to call upon Holy Scripture for proof, and even recite from memory many passages which they think support their position, although they understand neither what they say nor the things about which they make assertion.

—St. Augustine (354-430 A.D.)
"The Literal Meaning of Genesis"
Chapter 19: "On interpreting the mind of the sacred writer. Christians should not talk nonsense to unbelievers."

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Rosen, Moltmann, and the Anticipatory Paradigm

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This article begins with discussion of Robert Rosen's Anticipatory Systems, *outlines the concept of biological modelling processes, and connects the notion of anticipatory model with the notion of psychological archetype. The Great Mother is given as example. Rosen is cited on the distinction between teleonomy and teleology. Jurgen Moltmann's theology is referred to, in particular his idea that the universe is an anticipatory system. Telos is proposed as a unifying term. The paradigm is then applied to biblical hermeneutics, with typology seen as anticipatory progression; the raising of archetypes into succession of new contexts. The conclusion ties the three approaches together.*

Models, Archetypes, Teleonomy

There are signs these days that something akin to the old notion of *telos* is about to be revived. Quietly discarded by the mainstream about the time Laplace declared God to be an unnecessary hypothesis, *telos* went the way of "arguments from design," and for a couple of centuries ceased to be a respectable topic in polite scientific company.

Our eyebrows should be raised, then, at seeing *telos* brought back into the discussion by a man noted for his advanced speculation about the nature of living systems. Robert Rosen, theoretical biologist at Dalhousie, has made his reputation by examining the role of *modelling* among organisms; in particular by discussing the distinction between representation and reality, and its pertinence to the development of perception in the living process. Although Rosen's framework is conventionally Darwinian, in a book called *Anticipatory Systems* he breaks with established doctrine by suggesting something biologically unorthodox, i.e., that "a change of state in the present occurs as a function of some predicted future state, and [that] the agency through which the prediction is made must be, in the broadest sense, a model ..."[1]

The model, in Rosen's sense of the word, could be thought of as the internal aspect or *representation* of the organism's relationship with its environment. Every model, in such a system, is built upon a limited number of "observables." The observables are not simply qualities intrinsic to the environment, but are largely a function of the organism's capacity to "measure" the presence of those qualities. As an organism develops, new observables are encountered, old models fall into obsolescence, and a process of learning occurs. The model itself may be rudimentary, as in the following description.

> ... Many primitive organisms are negatively phototropic; they move towards darkness. Now darkness itself has no physiological significance; in itself it is biologically neutral; e.g. with moisture, or with the absence of sighted predators. The relation between darkness and such positive features comprises a model through which the organism predicts that by moving towards darkness, it will gain an advantage. Of course this is not a conscious decision on the organism's part; the organism has no real option, because the model is, in effect, "wired-in." But the fact remains that a negatively phototropic organism

> changes state in the present in accord with a prediction about the future, made on the basis of a model which associates darkness (a neutral characteristic in itself) with some quality which favours survival.[2]

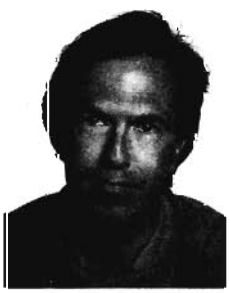
Models, then, may be seen as relatively simple, depending on the complexity of the organism and its needs. But if we leave the realm of phototropic organisms and move up the scale to the level of dogs or monkeys, then "modelling" in Rosen's sense may indeed be a very sophisticated business. The models we're talking about now are surely endowed with form and substance, and bear the texture of the actual world. The model at this level has the vivid, god-like features of what might be called an *archetype.* Rosen himself provides an example.

> ... If I am walking in the woods, and I see a bear appear on the path ahead of me, I will immediately tend to vacate the premises. Why? I would argue; because I can *foresee* a variety of unpleasant consequences arising from failing to do so. The stimulus for my action is not *just* the sight of the bear, but rather the output of the model through which I predict the consequences of direct interaction with the bear. I thus change my *present* course of action, in accordance with my model's prediction. Or, to put it another way, my present behaviour is not simply *reactive,* but rather is *anticipatory.*[3]

The model, in this case, is not a simple, static picture. Rather, it is dynamic; it tells a story. It has more to do with *doing* than with being; more like a verb than a noun. With this distinction in mind, then, it might be useful to remove the conscious human subject from Rosen's description and substitute the unreflective prehension of a creature less than human; a coyote, for example, or even better, something simian. What the unreflective subject encounters, on this hypothetical sylvan path, is an enormously powerful presence; not the indifferent kind of image that might appear on a computer screen, but an immediate reality demanding immediate action; understood not as something with a name—*bear*—but as an overwhelming force; menacing, vital, and compelling; the sort of experience an early human might have associated with a god. But there are no words for any of these things; there is only the "model." And the model, raised from the abstraction of an academic treatise, is nothing less than a full-blown archetype.

Archetypes, then, if we accept Robert Rosen's hunches, may turn out to be anticipatory models, and very important items in the struggle to survive. But the leap from model to archetype may seem too abrupt, and needs explaining. It could be argued, for example, that the bear in Rosen's account is just a bear, and the reaction just a normal fear response. Fear and flight are both instinctive answers to the particular situation, and both are appropriate. Rosen would probably argue that the instinct itself depends on the presence of the "model." Stated otherwise, the sight of the bear instantly activates the instinct, which refers to an internal image nested within an entire set of associated data. The response occurs only because the data is sifted and a selection made based on an assessment of future possibilities. All of this occurs, of course, within the twinkling of an eye, and attests to the efficacy of a very complex system.

The same process may be considered more generally in terms of a broad conception of archetype. Take the case of the Great Mother archetype so prevalent in pre-history: the faceless pregnant figurine of Laussel and Willendorf; or the goddess of historic times who sets the ruling king upon her knee. The mother figure *connotes;* or in other words, she *means* something. But to mean something, the image must be set in a context of associations. The mother's associations happen to be things like birth and life, warmth and nourishment, shelter and comfort. But they also happen to be death and decay, destruction and chaos, grave and gravity. The mother is earth, cosmos, matrix; in short, all the observables of the natural world that can be summed up as *cyclicity.* And if the archaeological record means anything at all, then the mother figure was



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being physically represented long before the birth of agriculture.

It should be clear, though, that the Great Mother is herself a kind of predictive model. Through the maternal model, the rhythms of existence are registered and anticipated, and human life comes to be ordered according to the observed cycles. The standard motif of the king seated on the mother's knee recognizes a sovereignty greater than the king's, and a subordination of human power to the power of death and cyclicity. The archetype, then, functions as an anticipatory model. The model anticipates the end of human glory in death, and its new beginning in birth. The king is transitory and contingent, while the mother endures through countless cycles.

But the whole notion of anticipation presents a minor snag; namely, "normal science" doesn't allow it.

But the whole notion of anticipation presents a minor snag; namely, "normal science" doesn't allow it. Rosen explains:

> ... *in any law governing a natural system, it is forbidden to allow present change of state to depend upon future states.* Past states, perhaps, in systems with "memory"; present state certainly; but *never* future states...
>
> ... A denial of causality thus appears as an attack on the ultimate basis on which science rests. This is also the reason why arguments from final causes have been excluded from science. In Aristotelian parlance, a final cause is one which involves a purpose or goal; the explanation of system behaviour in terms of final causes is the province of *teleology*.[4]

Rosen, in fact, is just as uncomfortable about teleology as most of his colleagues; so uncomfortable that he slides around the problem by borrowing a term coined in the 1950's: *teleonomy*. Now the difference between the two terms is not immediately clear. Teleology, it seems, has to do with final causes, or in other words, with *telos*. Teleonomy, at least the way Rosen uses it, has to do with a purposive or end-seeking process. Organically speaking, teleonomy refers to the end-seeking process that attempts to model its own end. Purpose is derived from *within* the process, and is essentially rooted in the past. The future is modelled on the data at hand, and the "future state" is not much more than an unconsciously calculated guess. The model, in other words, is a means of making *statements of probability*. Each model may be seen as a way of exploring the possible outcome of any given situation. It is probable, after all, that the bear will be a problem.

Moltmann's Angle

Given Rosen's flirtation with the No Man's Land of *telos*, it might be interesting to consider the question from another angle. It turns out that the concept of an anticipatory system has a central place in the theology of Jurgen Moltmann. Furthermore, it seems that Moltmann has formulated the idea without the slightest reference to the work of Robert Rosen. This in itself should arouse our curiosity; the development of modern science seems to show time and again that discoveries occur simultaneously among diverse minds focused on a similar problem. The case of Darwin and Wallace is perhaps the most celebrated.

In his book *God in Creation*, Moltmann introduces the idea of anticipation almost as a spin-off of his deeper theological concerns. As Moltmann sees it, though, anticipation is not just the domain of a biological modelling system, but applies rather to the entire cosmos. The universe, he says, is an anticipatory system whose coherence and self-transcendence express the unifying activity of the creative Spirit. All of it—quarks, atoms, molecules, mountains, what have you—anticipates a future state. The earth groans in expectant travail.

As Moltmann sees it, though, anticipation is not just the domain of a biological modelling system, but applies rather to the entire cosmos.

It should be added, for the sake of heretic hunters, that Moltmann's thinking is not just Hegelian dialectic dressed up in twentieth century jargon. Moltmann isn't talking about the immanent *Geist* that gradually becomes conscious of itself.

> In saying this we are interpreting the universe as the self-transcending totality of a diversity of communicating, individual open systems. All individual systems of matter and life, and all their complexes of communication as a whole, "ex-ist" into a transcendence and subsist out of that transcendence.

> If we call this transcendence of the world "God," we can then tentatively say: The world in its different parts and as a whole is a system open to God. God is its extra-worldly encompassing milieu, from which, and in which, it lives. God is its extra-worldly forecourt, into which it is evolving. God is the origin of the new possibilities out of which its realities are won...
>
> It is therefore impossible to think of this world-transcendence of God unless we think simultaneously of his world-immanence; and it is equally impossible to conceive of God's evolutive immanence in the world without his world-transcendence. The two are mutually related.[5]

By Rosen's standards, this is exalted language. Rosen is a biologist of relatively modest aims who in his private moments entertains thoughts about spirituality and purpose. Moltmann's profession, by contrast, permits him a much greater range of speculation. The two approaches are juxtaposed here, the scientist beside the theologian, to suggest the possibility of a unifying term that would make each intelligible to the other and to anyone else tinkering with the question. The unifying term, at least tentatively, could be the notion of *telos*.

The universe points beyond itself and anticipates its future state because of a transcendent purpose. Organisms model the future purposively because purpose underlies their existence and draws them forward to their goal. The modelling mechanisms are themselves by-products of a purposive process. Actuality thus unfolds in continuous dialogue with the potential.

Organisms model the future purposively because purpose underlies their existence and draws them forward to their goal.

At a level much deeper than the biological, the image of anticipation is reflected in the mathematical construct known as the wave function. Here again we see a structure that in a sense "models" future possibilities, representing all possible paths for a given particle. When the wave function "collapses," a single possibility is actualized out of a potential infinitude.

The poetic overtones are nothing less than apocalyptic. The collapse may be thought of as a revealing, or a disclosure of being; a "judgment" of sorts. And if this sounds fanciful, then think of the universe as a whole: a zillion zillion collapses at every instant and every point. The wave function may be seen as a tiny model of cosmic interconnectedness, a succinct representation of the possible ways everything connects to everything else. The universe thus consists of the continual vanishing of *all sets of possibilities but one.*

The universe thus consists of the continual vanishing of all sets of possibilities but one.

Moltmann, then, would appear to be right. The universe anticipates.

Anticipatory Hermeneutics

Whatever might be said about anticipation in a scientific context, it has some equally novel implications when applied to biblical hermeneutics.

Consider the meaning of typology, for example. What does Paul mean when he says that Adam is a *typos* of the Christ? Traditionally, we have said that the first "type" prefigures the second. Yeshua ben Nun prefigures Yeshua ben Joseph, as does the Joseph of Genesis and David the King. Events too are said to be prefigurative. Solomon's coronation ride through the Kidron Valley prefigures the Palm Sunday ride of Jesus. Etcetera. Prefiguring though, in this typological sense, may also be seen as a kind of anticipation. The first context anticipates the second. In a sense analogous to Rosen's, *each figure is an anticipatory model*; each figure in its original context anticipates a future context.

It may be recalled, from the opening paragraphs of this article, that Rosen's concept of the anticipatory model was roughly equated with the psychological notion of the archetype. An archetype, however we choose to understand the term, is simply an old figure. Archetypes *per se* thus come to be embedded in a succession of new contexts and acquire radically new meanings.

Scripturally, the process begins with Genesis. The archetype known elsewhere as the goddess Tiamat gets tucked into the creation story as the primordial chaotic sea—the *tehom*. The archetype of the universal flood gets re-expressed in the Noah story, and acquires its new connotations of apocalypse and promise. The new story in turn anticipates further apocalyptic models. The seed vessel which is Noah's Ark anticipates a new seed vessel which is

the Ark of the Covenant. A recurrent pattern emerges, and becomes a pattern of recurrent patterns. Narrative elements resonate with each other poetically through structural isomorphisms.

It would be extremely difficult, in the space of a short article, to outline the richness and depth of this interpretive scheme. But it should be noted at the outset that the question of historicity has been safely shunted aside. The historicity of Noah's Ark cannot be asserted. But the historicity of the second Ark most definitely can be. If the Ark of the Covenant never existed, nobody would have told a pointless story about David dancing in front of it. Even if Noah turns out to be fable, David can never be anything but fact. The Ark of the Covenant is clearly embedded in history. So the question is, how to account for the typological fitness of the two figures? How do we explain the isomorphism? If the first figure anticipates the second, what principle governs the anticipation?

Back in the discussion of Rosen's theory, it was pointed out that Rosen opts for a subtle distinction between teleology and teleonomy. The latter may be thought of as an organism's self-modelling process as related to a particular end, a kind of probable solution to a given set of possibilities. *Teleonomy is rooted in the past.* Teleology, by contrast, relates to an end or purpose beyond the scope of any internal modelling process. Rosen's anticipatory models are entirely teleonomical, based on an organism's ability to extrapolate from the "observables" at hand. If there is such a thing as a *teleological* model, then its projection of the future must be derived from a source outside the system that models; derived, in other words, from *telos.*

Teleonomy is rooted in the past. Teleology, by contrast, relates to an end or purpose beyond the scope of any internal modelling process.

The proposal to be made here is that there is in fact a teleological "model," and that the model itself suggests the distinction between teleology and teleonomy; but its terminology is couched in an old context and accordingly speaks instead of "prophecy" and "false prophecy." The teleological "model," in its broadest outline, is the book we call the Bible.

The biblical unfolding in turn needs to be seen as the successive re-combining of old figures in a series of new contexts in a way that old meanings are transcended by new ones. The Tiamat/*tehom* relationship is just one example of how the process works. Tiamat is an archetype; in Rosen's terms, an anticipatory model; in our own terms, a teleonomical model derived from the self-modelling process of human consciousness, mythically expressed as a maternal principle of cyclicity. The archetype then, is raised by the Genesis poet into a new field of meaning, and presented freshly as one small element in a larger picture. The *tehom* still anticipates, but what it now anticipates, in the Genesis context, is the Spirit that hovers above the face of the deep.

The teleological "model," in its broadest outline, is the book we call the Bible.

At a glance, it should be readily seen that biblical connections with extra-biblical myths are not to be dismissed. The connections are deep and permanent, and become increasingly obvious as the old myths become available to the modern intellect. The emergent pattern, though, should place the old myths in perspective. The process of biblical revelation appears to take the old figures, the old human models of cyclicity, and set them in the midst of new circumstances that point ahead to further developments. The anticipation of the Bible is teleological because it narrates a movement initiated and sustained by the Eternal Purpose. Its final reference is always beyond the understanding of its human authors.

Telos, then, comes to be seen as the term that unifies a number of diverse approaches. Rosen's models make sense in the context of Moltmann's universal anticipation, which in turn makes sense through the lens of biblical narrative. The anticipation of the cosmos turns out to be the groaning travail of the earth. The anticipation of the Bible turns out to be the yearning of creation for its eschaton. Both creation and revelation may be seen together as part of a seamless continuity, held in coherence through the telic agency. The term *telos,* if properly understood, could eliminate the apparent contradiction between evolution and creation, while accounting for the unique flavour of the Genesis account. *Telos* potentially integrates the biblical framework into a more general conception of human consciousness.

There is a further implication to be considered, so huge in scope that we need to stand back just to get a glimpse of its looming shape. If, as suggested, old figures acquire new meanings by being raised into new contexts, then perhaps the teleological model itself submits to the same kind of process. What would happen, for instance, if the Bible were allowed to speak freshly in the context of the late twentieth century? Would it reveal meaning that our ancestors never had the chance to suspect? Would it tell us something about our reality that the seventeenth century couldn't have guessed? Do the new observables in science and mythology entail a new understanding of scripture?

The suggestion here is that they do.

The nineteenth century conflict between science and theology may be due for a final collapse. The old bogey man called evolution may come to be seen, finally, as the accelerating process by which time issues from eternity and moves towards a final purpose. It will be seen, though, not as a process pushed from behind and molded by the blind workings of chance, but as the movement of a dynamic whole called forth towards a potential future. To the extent that various autonomies within the system model their potentialities and extrapolate from past to future, the system may be seen as *teleonomical*, i.e., purposively oriented from within. The "self-organization" of the universe is in this sense a very real aspect of the process, and represents the freedom granted in the phrase "Let there be."

What would happen, for instance, if the Bible were allowed to speak freshly in the context of the late twentieth century?

But teleonomy is not the whole story. In its periodic leaps from old ecological stabilities to radically new ones characterized by the synchronic appearance of vast numbers of new forms, the ongoing coherence of the universe expresses the unifying activity of a transcendent purpose. This overall coherence of an irreversible process may be interpreted *teleologically* as an in-forming of creation by the Eternal. To paraphrase Jurgen Moltmann, the universe is an anticipatory system open to the creative activity and calling of the Spirit.[6]

The universe, in this new way of seeing, is no longer *compelled* to evolve; it is *invited*. We who are its conscious representatives are called according to the same purpose, and thus share its travail and expectancy. Our anticipation derives from the same source; and our calling is nothing less than the impassioned calling of God to the whole creation.

Theological Implications

For the orthodox, the anticipatory view is not without problems. How, for example, should we interpret the place of Christ in the present scheme? Even though such questions are beyond the proper scope of this essay, a couple of remarks may be helpful.

The old bogey man called evolution may come to be seen, finally, as the accelerating process by which time issues from eternity and moves towards a final purpose.

The first is that if the theme outlined here is close to the mark, then our understanding of redemption is due for an overhaul. In the same way the early Church groped for centuries towards its formulation of the Nicene Creed, we may, as a body, find ourselves re-thinking the whole matter; not, as some may suspect, because we reject the authority of Scripture, but because the scriptural authority directs us in new ways. If this sounds shaky, try turning again to the Book of Job, where Elihu spells out his view of God and the cosmos, and try to relate to his way of seeing. Human understanding changes, and we can't do anything to make it hold still. Storms and earthquakes may indeed be "acts of God," but they are also processes within a continually changing creation. Separating the two may no longer be as easy as we would like to think.

The solution, if there is one, will not lie in pantheizing the Gospel, but in reconsidering the elements we've always had at hand; namely, the immanent/transcendent framework of the biblical revelation. New understanding may be achieved in harmony with the old if we hold to the principle that no old doctrine should be violated. Orthodoxy is not to be denied, but affirmed and expanded. The alternatives to this rule are an entrenched conservatism that clings to the cultural accretions of a dead age, and a theological liberalism that devalues

the content of Scripture. We are indeed householders taking out of our storeroom things old and new.

The second remark is that the Christ event, occurring at a time when the rate of change in history is already gathering momentum, needs to be seen as a message nested within a message. The outer message may be seen as God's self-advertisement to human consciousness. That is, a message is enveloped in historical events in such a way that a context for the message is slowly prepared over the course of two millenia; partly by means of the process described above. Jesus doesn't just drop down out of the sky or appear suddenly out of a lotus blossom. The message, when finally spoken, is directed specifically at humanity, and is received first of all through the understanding. "Faith cometh by hearing, and hearing by the word of God." The calling of God, present from the beginning as *Logos*, is now focused in an appeal to creation's conscious component, but to a consciousness gone awry. By and large, this is what the Church is about; a kind of body that lives in the world as an ongoing witness to the Christ event, "proclaiming the Lord's death until he comes again."

At the conscious level, the "primordial catastrophe" called Sin is counteracted by a direct appeal to repentance.[7] *Metanoia*, in fact, may be nothing less than the teleological response that breaks us out of the old self-modelled patterns of thought and action, rooted in a teleonomical nature. Redemption thus works, at least in part, at the level of consciousness. Ultimately, *metanoia* moves us towards prayer, which takes us beyond the power of our own thought and opens our hearts to the Eternal. Whatever else the Crucifixion may mean for us, it seems to be God's way of getting our attention. "Here I am," He says, "and look what you've done to me." The Cross is literally the crux of the whole relationship.

The inner message of this event includes all the specifics. The truly good news it imparts is that redemption doesn't depend, finally, on how or what we think. Having the answer is not the answer. Redemption is *God's* work, and the work does not cease. The Incarnation is the sign of God's immanence. The Resurrection is the sign of His transcendence. Redemption is God's hidden leaven in history, and the individual believer is invited to share in its leavening action. Both its meaning and movement remain a mystery. What we do know is that poetically speaking, the promise of redemption is God's promise to Noah; a promise to the whole creation. For the believer, anticipation means hope; an eschatological yearning, the future state of God's kingdom acting on the present; God's purpose dwelling among us. ❋

NOTES

[1]Robert Rosen. *Anticipatory Systems*. Oxford: Pergamon Press, 1985, p. 8.
[2]op. cit., p. 7.
[3]op. cit., p. 7.
[4]op. cit., p. 9.
[5]Jurgen Moltmann. *God in Creation*. New York: Harper and Row, 1985, pp. 205-206.
[6]op. cit., p. 205.
[7]"Primordial catastrophe" is an expression borrowed from various works of Walker Percy.

In the age of science, scientists are the princes of the age. Artists are not. So that even though both scientists and artists achieve transcendence over the ordinary world in their science and art, only the scientist is sustained in his transcendence by the exaltation of the triumphant spirit of science and by the community of scientists.

It is perhaps no accident that at the high tide of physics in the nineteenth and early twentieth centuries, the great revolutionary physicists—e.g., Faraday, Maxwell, Bohr, Einstein—were also men of remarkable integrity and exultant wholeness of character, of generosity and benignity. Compare the lives and characters of the comparably great in literature at the same time: Dostoevsky, Baudelaire, Kafka, Joyce, Lawrence, Hemingway.

—Walker Percy, *Lost in the Cosmos*

Dialogue

Of Pandas and People: The Central Questions of Biological Origins

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Of Pandas and People is intended as a supplementary text for high school biology classes. The authors are Percival Davis and Dean Kenyon, along with the editor, Charles Thaxton, who wrote the last section.

The Positive Value of the Book

There are many positive features about this book. Not the least of these is that it is the first credible attempt of its kind to offer the scientific case for a creationist view in a text intended for public schools and published by a secular publisher. The format and layout of the book are attractive, and most of the charts are well done. It is printed on a sturdy stock, which is essential for classroom use. In general, the literary style communicates well, and there are other helpful features, such as a glossary and self-pronouncing guide. The title is not very descriptive, but this is somewhat redeemed by the subtitle, "The Central Questions of Biological Origins."

On the whole, the scientific accuracy is good and, generally speaking, the authors do not overstate the case. The age of the earth question is handled very well, not siding in particular with either the young or old earthers. Given the space limitations, the treatment is generally comprehensive. All in all, the authors should be congratulated on a good job. It is the best book available in its category, but unfortunately it is practically the only book in its category.

Some Difficulties in the Book

Like other books by creationists, there is room for improvement. Some friendly observations and suggestions in various categories are in order.

Errata and other Mistakes

Judgment is spelled with the "e" on pages 32 and 34 (maybe elsewhere), but without it on page 122. Further, it has now been 130 years since Darwin wrote, not 125 as the authors state on page 94. Likewise, it was 1858, not 1859 (p. 108) that Darwin and Wallace jointly presented their paper on natural selection, a year before Darwin's *Origin* was published. These, of course, are all minor errors and do not affect the central theme of the book.

Comments on Terminology

The authors of *Pandas* avoid the word "creation" like the plague. Presumably, this is to avert rejection of the text by the secular market. But why should we be paranoid about the word "creation"? Evolutionists use the term. Darwin even called it the "theory of creation" several times in *Origin*. Synonyms such as "intelligent design" won't fool the enemies of creation and may alienate many of its friends. Anti-creationists will see words like "made," "design," or "artisan" as synonyms with "creation." Sharper opponents to creation will view references to an "intelligent cause" who "made" some "creatures" as verbal hide-and-seek (p. 25). Why not come right out and admit this is a book defending creationism?

Furthermore, by trying to appease one's enemies we may lose our friends. If we water down our view so much, other creationists may not recognize it as a defense of creation, or consider it so anemic that it is ineffective. What is more, the text is not consistent in avoiding the word "creation." It slips in twice on page 133 and once on page 59. Even "special creation" occurs once (p. 107). It would not have diminished the effect of the book to inter-

change the word "creation" with "design" throughout the book.

Avoiding the word "creator" leads to some cumbersome expressions like "master intellect," "intelligent artisan" and even "primeval intellect," all of which leave something to be desired. Since the word "creator" has always had a non-religious connotation in our language, there is no reason to avoid it like the bubonic plague.

In a few places the authors overstate their case, at least from the strictly scientific point of view they claim to take. "No one knows" is too strong a phrase (p. 86). Likewise, "must have originated from an intelligent cause" is over extended (p. 7). Also, "cannot be known" should more properly be "is not known" (p. 66).

Comments on Crucial Concepts

The claim that "life can only come from life" (p. 1) will seem inconsistent when the whole thesis of the book is that a pre-life "primeval intellect" produced life. It would be better to say "Non-life does not produce life." For if life only comes from biological life, then it could not come from a non-biological "primeval intelligence."

The argument on page 13 is cast in terms of probability ("How likely is it ... ?"). However, using probability is also inconsistent with the overall thrust of resting the case on the principle of uniform experience (p. 161). The reason for positing an intelligent cause of first life is not the improbability of natural causes. Instead, it is repeated regularity of an intelligent cause of specified complexity.

Further, the text claims that the creationist's view is not based on "gaps" in the fossil record (p. 100), yet the word "gaps" is used in the heading on the same page and elsewhere in the same context without any quotes around it (pp. 96, 107). This appears to be inconsistent and plays into the evolutionist's hands in ways which creationists wish to avoid, since "gap" may imply that evolution is true but only some evidence is missing.

The authors claim that intelligent design and evolution are considered opposites (p. viii), and yet the possibility of theistic evolution is admitted (p. 113). But since theistic evolutionists believe that the Creator used evolution to design the world, this will seem inconsistent to them.

In my opinion the most serious mistake in the book is the claim that the supernatural has no place in science, an unfortunate reversal of Thaxton's earlier view (see *Mystery of Life's Origins*, 1984). This claim is calculated no doubt to appease the opponents of creation, but it creates some very serious problems. *Pandas* insists that science (even origin science) does not deal with the supernatural or even with the philosophical (pp. 155-157). However, origin science by its very nature is philosophical. For it admits that we cannot "see" an intelligent designer but must rather merely "infer" one by use of the philosophical principles of causality and analogy. And in so doing, we are making a rational "inference" to a supra-human (p. 159), "primeval intellect" (p. 33) that is an "outside [of the world] agency"! Origin science is by nature a speculative reconstruction of the past, not an empirically testable part of operation science. Thaxton acknowledges this when he says it is not empirical but rather "forensic" in nature (p. 157).

By insisting that origin science can have nothing to do with the supernatural, several undesirable consequences follow. First, it disassociates itself from historic (and many contemporary) creationists, indeed, from its very supporting constituency. Second, the "design view" does not distinguish itself from naturalistic (pantheistic) "creationists" who see the creator within the universe. At best, they are very uncomfortable bedfellows. Finally, even if the book is accepted by the academic community, which is doubtful, the victory will be at best a shallow one. In fact, many creationists will consider it a defeat because it capitulates the historic creationist belief in a supernatural Creator.

Using the same kind of principles by which the "design view" claims to be scientific but not philosophical or religious, other creationists can point to a supernatural cause of the universe. All that is needed is the principle of causality plus the empirical evidence for the origin of the material universe. For instance:

1) Every event has a cause (principle of causality).
2) The whole natural universe had a beginning (Second Law of thermo-dynamics, etc.).
3) Therefore, there was a non-natural cause beyond the whole natural universe.

This kind of speculative inference is just as "scientific" (in the sense of an origin science) as is positing a "primeval intelligence" or a "master intellect" of first life. Furthermore, if we allow only causes within the natural universe (whether primary or secondary), we are making a philosophical claim that science is naturalistic.

If the authors of *Pandas* wanted to avoid the question of the supernatural, it would have been better to simply grant that, as far as the argument for an intelligent cause for life goes, they are neither affirming nor denying it is supernatural. But when they go beyond this and claim that "science [even origin science] does not include the supernatural" (p. 161), they have thereby established an implicitly naturalistic nature of science. Many will see it as a betrayal of creationists' cause to claim, as they do, that "the science classroom is not the proper place to introduce either Naturalism or Supernaturalism" (p. 161). Indeed, by denying that inference can be made to a supernatural cause from scientific evidence, the book has fallen into the hands of the very naturalists the authors want to avoid. For by disallowing causes beyond nature, it unwittingly capitulates to Naturalism, which claims that only natural causes count in science. It is the word "only" that makes the view a form of Naturalism. So, ironically, this book surrenders to the very enemy creationists have been fighting for so long. ❋

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As an avid reader of reviews, I am always intrigued by the rare book that draws the praises of leaders on both sides of a debate. When both sides roundly criticize a work I usually conclude it is probably not worth reading. But what should a reader do in the case of *Of Pandas and People*, a book which purports to be about the science of biology for high school, and which is being rebuked by some scientists for being a religious tract, and by some theologians for eliminating the supernatural? In this case I am especially interested because I served both as developer of the book's approach and academic editor for the project.

Several critics in *Bookwatch Reviews*, a publication of the National Center for Science Education, wrote that "Teachers should be warned against using this book."[1] According to them *Pandas* "lies outside of science in promoting a sectarian, religious view."[2] Their biggest concern, however, is that unsuspecting teachers will be seduced by this work of "cleverly-disguised 'scientific creationism.' "[3] In the opinion of Gerald Skoog, science textbook analyst from Texas Tech University, "This book has no potential to improve science education and student understanding of the natural world."[4] Kevin Padian, a Berkeley paleontologist and one of the authors of the new California Science Framework, can't decide "what is worst in this book: the misconceptions of its subtext, the intolerance for honest science, or the incompetence with which science is presented."[5] Michael Ruse, a philosophy of science professor at Guelph University and an expert witness for the ACLU during the Arkansas creation case, said in his characteristically sweeping style, "This book is worthless and dishonest."[6]

It must surely come as a shock to the above reviewers to learn that Dr. Geisler, mercilessly branded as a "creationist know-nothing" during the Arkansas creation trial, concludes that *Pandas* goes so far as to deny the supernatural, and "unwittingly capitulates to Naturalism."[7]

So, which reading of *Pandas* is correct: the critics' of *Bookwatch Review* or Geisler's? Instead of giving a detailed response, I will address what I believe are Dr. Geisler's main points. In addition I would like to issue a challenge to the membership of ASA to debate the issue of whether, as I claim in the "Word to the Teacher" in *Pandas*, intelligent causes are acceptable in science. My contention is that intelligent cause has never been eliminated as a legitimate candidate for a cause in science. Currently, intelligent cause is used in some areas of science, e.g., archaeology and the SETI program. We only extended its use into the realm of biology, not by dogmatic assertion, but by legitimate inference. We chose not to use the traditional terminology of creation and creator in order to emphasize that our case was based on experience, not the Bible. Dr. Geisler is correct, of course, that the words creation and creator have a secular usage. What we wanted to "avoid like the plague" was our readers' thinking we were reading Genesis into science.

For Geisler, our offense in using the term "intelligent cause" seems to have been that we did not

make a definitive statement as to philosophical category when we used it. We did not do so *on purpose*. We meant to be equivocal. When someone affirms by experience that some phenomenon had a natural cause, does it automatically inform us as to his or her metaphysical commitment? Of course not. This has been and is part of the genius of modern science. Both theists and atheists can practice science. Theistic scientists may say to themselves that God is above or behind the recurring natural processes they describe, and atheistic scientists may mumble under their breath that nature is all there is. What they say in print or utter in public forums, however, is that the particular phenomenon under discussion is explicable in natural cause terms. We only want the same courtesy extended to intelligent cause, where experience justifies, to use it in a generic sense without it automatically being used to determine one's metaphysical stance.

Yes, I did say that "science does not include the supernatural." But does that make me opposed to the supernatural? Would a blind man be opposed to color because he does not see a rainbow? Rather, would it not be that a blind man simply lacks any sensory means for detecting it? That is my claim for why science does not include the supernatural. It is not for Dr. Geisler's supposed reason of opposition, but simply that with the methods of sensory experience we do not apprehend the supernatural. Because of the limitations on the methods of science we were left with no alternative but to leave the identity of the intelligent cause affirmed by experience unspecified as to philosophical category.

It seems to me the *Bookwatch* reviewers merely *assumed* that by intelligent cause we meant supernatural creator, and objected. Geisler, on the other hand, saw the claim that science does not apprehend the supernatural, and concluded we were denying the supernatural. We tried to limit ourselves to what could be legitimately said on the basis of experience, without regard to metaphysical stance, just as above in the case with natural cause.

Dr. Geisler points out correctly that our " 'design view' does not distinguish itself from naturalistic (pantheistic) 'creationists' who see the creator within the universe."[8] He may be uncomfortable with this, but how else can we teach biological origins in public school science classes, including the case for intelligent cause, without it being apologetics? If the Creator could make birds, trees and butterflies without labels saying "made by God," why is it not okay for us to remain equivocal as to cause?

Both the critics of *Bookwatch Review* and Dr. Geisler seem to have adopted a natural/supernatural dichotomy in reading *Of Pandas and People*. In other words, they have read a purported science work through the glasses of metaphysics. Natural/supernatural is appropriate language for discussing metaphysics. And even though scientists practice their science within the framework of some kind of metaphysics, science itself neither affirms nor denies the supernatural. Likewise science neither affirms nor denies that nature is all there is. Science is quite simply blind to metaphysics, which people choose or adopt for themselves based on a host of factors, perhaps including science itself.

The issue involved in an examination of *Of Pandas and People* is much larger than the merits of this one book. Is it possible, or is it not, to make a case for intelligent design without embracing strictly theological answers instead of scientific ones? If it is possible, and we have failed, then there is hope that someone may do it. If it is not, then in principle we are left with only natural cause answers in science. Many scientists have justified their stance of philosophical naturalism on this logic.

Our aim in *Of Pandas and People* was to present an intelligent cause origins perspective for high school biology without bias in favor of either theism or naturalism. Just as it is possible to maintain a natural cause perspective on biological origins without becoming a humanist or a philosophical naturalist, so it is possible to hold an intelligent cause biological origins perspective without becoming a pantheist or bringing the supernatural into science. In other words this approach shows how to make an intelligent cause origins case for biology without indoctrinating in either theism or naturalism, thus preserving the integrity of science. I do appreciate Dr. Geisler's review and the opportunity to respond to it here. ❋

Notes

[1]*Bookwatch Reviews*, Volume 2, Number 11, 1989, p. 1. Published by the National Center for Science Education, Inc., P.O. Box 9477, Berkeley, CA 94709. Eugenie C. Scott, publisher, Gordon E. Uno, ed.
[2]ibid.
[3]ibid.
[4]Gerald Skoog, p. 2.
[5]Kevin Padian, p. 4.
[6]Michael Ruse, p. 4.
[7]Norman L. Geisler, *PS&CF*, this issue, p. 248.
[8]Geisler, *PS&CF*, this issue, p. 247.

"Reason/Faith"

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I am writing in response to Richard Bube's "Penetrating the Word Maze" on "Reason/Faith."[1] I would like to propose an alternative.

Bube's primary concern was the dichotomy, or "false distinction" which has been advanced between reason and faith. While he argued that science has a faith component and religion a rational component, he allowed the dichotomy between faith and reason to stand, going so far as to describe reason and faith as two poles on a particular axis of human experience. Rather than demonstrating that the wall separating reason and faith is an illusion, Bube attempted to move science and reason up the wall and toward the center of the axis. The danger of placing both reason and faith on the wall is that, like Humpty Dumpty, they could fall and philosophers of science and religion alike would be unable to put the pieces together again.

Rather than trying to make reason and faith into two points on a continuum, we need to recognize that the two describe two different things. Comparing them is akin to comparing apples and oranges: they're both fruit, but apples are certainly not the opposite of oranges.

Faith refers to a basic trust one has in the object being studied, whether creation (in science) or the Creator via the Church (in theology).[2] Once that basic trust is established, then inquiry can proceed; this is where reason enters in. Utter faithlessness in the created order, or in our own sensory faculties, leads ultimately to solipsism, or to agnosticism (which is a religious version of solipsism).

Trying to create a continuum with faith at one end and reason at the other confuses the issue. Both are necessary for orderly inquiry (just as apples and oranges are both fruit), but each deals with a different aspect of human inquiry; they are not polar opposites but complementary parts of a whole. Furthermore, once faith and reason are brought into proper relationship, other aspects of the inquiry process begin to make better sense.

Doubt

Because of our Western philosophic tradition, the subject of doubt must be an integral part of our understanding of faith and reason. My dictionary[3] indicates that belief and doubt are opposites. Doubt is "a feeling of uncertainty," or "a feeling of disbelief," or "an uncertain state of affairs."

Along this same line of thought, in the tradition of the Western rationalists, empiricists and skeptics, doubt is an integral part of reason. Universal doubt, in the Cartesian tradition, was supposed to allow us to move beyond all ideas based merely on trust. In other words, doubt would liberate us from mere belief and allow us to enter the objective world of reason.

But we still have all our fruit mixed into a single basket. How does doubt relate to faith? How does faith relate to science? How does Christian faith relate to theology? In the fruit basket of the western philosophical tradition, these questions are very difficult to sort out.

It would be best to begin with the nature of doubt. Michael Polanyi argues that, far from being opposite, there is an "equivalence of belief and doubt."

> Suppose somebody says "I believe *p*" where *p* stands for "planets move along elliptic orbits," or else for "all men are mortal." And I reply "I doubt *p*." This may be taken to mean that I contradict; which could be expressed by "I believe *not-p*." Alternatively, I may be merely objecting to the assertion of *p* as true, by denying that there are sufficient grounds to choose between *p* or *not-p*. This may be expressed by saying "I believe *p* is not proven."[4]

Polanyi illustrates two types of doubt in the above statement. The form of doubt which involves outright denial is clearly akin to belief: "I believe *p*" is an equivalent statement to "I believe *not-p*". The second form of doubt in the above statement is different in that it does not assert the truth or falsity of *p*. Yet it still assumes belief because it involves

the suspension of such belief: "I believe p is not proven."

Faith is an unavoidable phenomenon; doubt involves an act of faith. What this means is that everything we call "factual," "truthful" or "proven" has its foundation in an unproven belief. We call these presuppositions. Scientists cannot prove "beyond a shadow of a doubt" that the speed of light is absolute, nor can theologians prove "beyond a shadow of a doubt" that God is absolute, although both presuppositions are assumed. All "facts" are built upon presuppositions; all life has a faith component.

Religion or Theology?

But does religion not require more faith than science? This is another type of fruit in our fruit basket. One must make a distinction between religion and theology. Bube's discussion on this was not particularly helpful either.

> The ideal of science is to be as objective and independent of one's subject as possible; the ideal of Christian faith is to commit oneself personally and wholly to Jesus Christ, trusting God's promise in Him and being obedient to His words.[5]

Notice that Bube is comparing science and Christian faith rather than science and theology. Christian faith is different from any science, including theology, in that it operates primarily at the level of our presuppositions and is therefore neither verifiable nor falsifiable. Polanyi describes it this way:

> Religion, considered as an act of worship, is an indwelling rather than an affirmation. God cannot be observed, any more than truth or beauty can be observed. He exists in the sense that He is to be worshipped and obeyed, but not otherwise; not as a fact—any more than truth, beauty or justice exist as facts. All these, like God, are things which can be apprehended only in serving them.[6]

Theology, on the other hand, operates with a different set of parameters. Karl Barth describes theology as a "critical science."

> Dogmatics [systematic theology] is the testing of Church doctrine and proclamation, not an arbitrary testing from a freely chosen standpoint, but from the standpoint of the Church which in this case is the solely relevant standpoint.[7]

Notice what the subject of theology is, according to Barth; it's not God in a direct sense, rather it is Church doctrine and proclamation. That is, the Word of God as it is used in the life of the Church. If all we had to say about God is what Polanyi said, then one could rightly question our theological legitimacy. Rather what I am proposing (and this is not an ingenious invention, this is the heart of the tradition as I understand it) is that theology studies God indirectly. God told Moses to stand in the cleft of the rock; while God passed by, He would shield Moses with His hand. All that Moses was privileged to see was God's backside; God's glory was too overwhelming to see directly.[8] Likewise, our study of God is not direct but indirect. We study the Church; we study the scriptures. As the scriptures and the people of God are filled by the Holy Spirit, the study of these objects becomes a study of God.

And studying God from this indirect route allows us to begin to develop a scientific method for going about it. God may not be verifiable, but God's Church is. Theology is a second order phenomenon subsequent to faith in God; it assumes faith, and is built upon faith, although it uses the tools of any other scientific discipline.

Christian Faith vs. Scientific Facts?

This rather extended discussion of theology can then be applied to science. Science is also a second order discipline; it assumes faith in a reasonable universe. This assumption is unverifiable, although the sciences have developed a highly complex system which is built on that assumption.

But what happens when "the facts of science" conflict with "the faith of the Church"? Once again we run into another different piece of fruit in our fruit basket. First of all, we in the Church must admit that we have a rather bad record in these sorts of things. The Church has tried to pass off its mistaken presuppositions as facts. The Church turned the platonic concept of the perfection of the circle into a presupposition of the perfection of God. This lack of critical reflection forced them into a situation where they had to try Galileo for heresy (and force him to recant) for challenging this basic presupposition by declaring (in the Copernican tradition) that the planets had elliptical orbits around the sun.[9] The same thing is occurring in the creation/evolution debate with some parties making a platonic (rather than biblical) conception of perfection a matter of presuppositional faith.

Nor has science always been the innocent bystander. At the risk of becoming yet another Sagan basher, as one who is interested in serious and honest scientific endeavor I find his authoritative statements on PBS to be particularly bothersome.

So it is true that theology and science do at times clash; it is true that they make competing truth claims. But as Christians in science we dare not be duped into thinking that this is a battle of faith vs. reason. If science and theology are at loggerheads it can only mean that one or the other has made an illegitimate assumption; in other words, the faith of either the science or the theology is misplaced faith at this point. Through the process of doubt and reason the presuppositions of both science and theology should then be tested until a new understanding of reality is developed which can embrace both the faith of the theologian and the faith of the scientist.

Faith and Reason Revisited

And this leads us full circle (or is that full ellipse since there seems to be more than one focus) to the question of the relation between faith and reason, but this time around, from a different perspective. If faith and reason describe two different aspects of the process of inquiry rather than two poles on the axis of inquiry, is there more to the process of inquiry than just faith and reason? I believe that there is.

Robert March makes the audacious claim that "an idea must be more than right—it must also be pretty if it is to create much excitement..." [10]

> Creativity in any field has an emotional dimension. This may seem surprising, in view of what we are always told about the rules of scientific objectivity. But these rules only concern the way in which an idea gets its final test. The way in which a new idea arises is usually quite the opposite of objective. And if the idea strikes the audience as beautiful, it is likely to be believed even in the absence of confirming evidence and clung to tenaciously until the evidence against it is overwhelming. The creator of an abstract scientific idea has as much of his personality in it as any artist.[11]

The Slavs seems to have a better grasp of the importance of this issue. Two illustrations, one from science and one from theology, will have to suffice. Michael Polanyi, for instance, puts great emphasis on simplicity and beauty. In a most interesting recital of the story of the theory of relativity he indicates that the theory's "inherent beauty and power" had a lot to do with its acceptance.[12] This is also true of the Russian theological tradition. Such was the primary thrust of Russian theologian Pavel Florensky whose work (described as aesthetic theology) has been highly influential in Russia, even outside the church.[13]

Faith and reason are certainly an important part of the process of inquiry, but inquiry is a full-orbed human activity and therefore must include aesthetics, intuition (scientific hunches) and passion.[14] Once that basic stance of trust (faith) is established, then aesthetics, intuition, and passion lead us to theories which can either be verified or falsified with reason and experimentation. All these can be put to the service of exploring and understanding the creation (or, in the case of theology, the Creator through the Church).

The reason/faith and science/religion question is deeply entrenched in our Western psyche. If we want to avoid being put in the place of "all the king's horses and all the king's men," who were busily trying to put Humpty together again, we need to carefully rethink the issue. Not only do we need to reevaluate the relationship between faith and reason, we need to reevaluate the whole schema which has placed these two complementary aspects of inquiry at odds with each other. ❄

Notes

[1]Richard H. Bube, "Penetrating the Word Maze," *Perspectives on Science and Christian Faith* 42(2):119-120, 1990.

[2]This is not meant to be a definition of theology; farther down we will touch upon that subject. I define theology as a science, so I do see many parallels between theology and the other sciences. My point here is that the physical sciences and theology have two different objects of study. That does not make one inherently more objective than the other, it simply makes them different.

[3]*Oxford American Dictionary* (New York: Avon Books, 1980).

[4]Michael Polanyi, *Personal Knowledge* (Chicago: Univ. of Chicago Press, 1958, 1962), p. 272.

[5]Bube, "The Word Maze," *PS&CF* 42(2):120.

[6]Polanyi, *Personal Knowledge*, p. 279.

[7]Karl Barth, *Dogmatics in Outline* (New York, Harper & Row, 1959), p. 12.

[8]Exodus 33:12-23.

[9]See Harold Nebelsick, *Circles of God: Theology and Science from the Greeks to Copernicus* (Edinburgh: Scottish Academic Press, 1985), esp. pp. xxi-xxvii and ch. 5, "Copernican Cosmology."

[10]Robert H. March, *Physics for Poets*, 2nd ed. (Chicago: Contemporary Books, 1983), p.1.

[11]Ibid., pp. 1f.

[12]Michael Polanyi, *Personal Knowledge*, pp. 9-15. Polanyi even makes light of how lay people are taught to "revere scientists for the absolute respect for the observed facts..." when in fact, other factors, such as beauty, symmetry, and simplicity play a significant role (pp. 12f).

[13]For an accessible introduction to this great theological tradition see Anthony Ugolnik's *The Illuminating Icon* (Eerdmans, 1989).

[14]Polanyi spends a whole chapter discussing the nature and necessity of passion in the pursuit of truth. Passions, like other aspects of inquiry, can both promote and obscure the truth depending on the circumstances, but they are nevertheless an integral part of inquiry. See *Personal Knowledge*, ch. 6, "Intellectual Passions," pp. 132-202.

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Attempts to deal critically with subjects like "faith/reason" reveal the intricacies of "penetrating the Word Maze." Most subjects like this require extended consideration, careful definition, and a good deal of patience before major headway in communication and understanding is achieved. It is probably inappropriate to regard a brief, popular column trying to deal with simple misconceptions of the subject, as adequate to bear the burden of extended philosophical analysis.

As an example, considering pure faith and pure reason to lie on the poles of a single axis with science and theology intermediate, is one way to emphasize their similarities in spite of their differences; it is one perspective intended to counter the claim that the two have nothing in common. It does not presume to claim that all of reality is completely described by this device, but rather that the reason/faith axis may be viewed as one particular cross-cut of the intricate schema of reality. Considering faith and reason to be apples and oranges is another way of describing some of the same characteristics; it focuses on their differences perhaps more than their similarities. The two descriptions should be seen as complementary, not necessarily competitive.

It is not clear whether Nelson approves of an attempt to demonstrate "that the wall separating reason and faith is an illusion," or not. His statement that faith and reason "describe two different things" appears to support a dichotomy between them.

Although it is true that faith provides the basis for rational inquiry, it is not true that reason enters only after faith has been established. A rational faith is developed as the results of a consideration of the evidence, and this is a process involving reason. Perhaps the outstanding lesson is that faith and reason are so intricately interwoven in human experience that the attempt to dissect them is a questionable one.

Nelson points to my contrast between the ideal of science and the ideal of Christian faith as an example of a failure to properly distinguish between Christian faith and theology. Again this may be part of the attempt to treat the issue popularly in the Word Maze column. But I think that implied in the column itself, as well as set forth in detail in my other treatments of the issue, I have emphasized that just as science is a human interpretation of the natural world, so theology is a human interpretation of the Bible and human experience. Therefore theology and faith are not the same thing, in agreement with Nelson. We agree completely that "if science and theology are at loggerheads it can only mean that one or the other has made an illegitimate assumption."

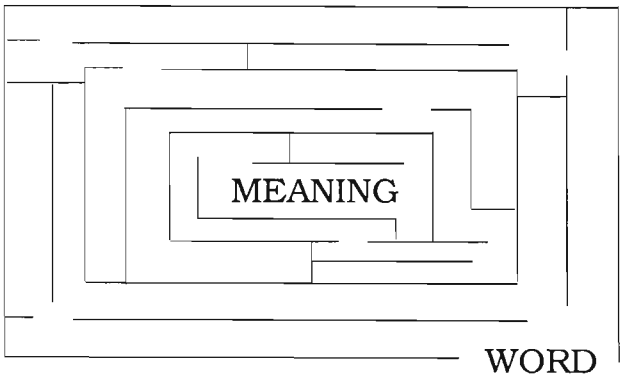
Having tried to find some ground of difference between us, I must confess that what is more striking is the extent of agreement. I have been a staunch advocate for many years of the perspective in which scientific and theological descriptions are viewed as complementary.[1] If my simplified model of two points at opposite ends of a continuum, introduced here to deal with a particular misconception, seems to contradict this, then the reader should be aware that such is not the intention.

Nelson and I agree completely that "everything we call 'factual,' 'truthful,' or 'proven' has its foundation in an unproven belief." We agree completely that "All 'facts' are built upon presupposition; all life has a faith component." And we agree completely that "inquiry is a full-orbed human activity and therefore must include aesthetics, intuition (scientific hunches) and passion," and this is stated explicitly in the Word Maze article.

Perhaps the way that I said things in this limited article may have raised problems, but the important thing for the reader to know is that I believe that Nelson and I really are in basic agreement. ❄

[1]See, for example, R.H. Bube, "The Relationship between Scientific and Theological Descriptions," *Journal ASA* 38, 154 (1986).

Penetrating the Word Maze



Taking a look at words we often use—and misuse...

This column has been a regular feature of **Perspectives on Science and Christian Faith** *since June 1988, and has been written by Richard H. Bube, Professor of Materials Science and Electrical Engineering at Stanford University, Stanford, California. This is the last of eleven columns.*

Because this is the last column, we depart from our usual practice of considering only one or two words, and focus instead on a recent court case that dramatically illustrates the problems of penetrating the Word Maze.

In 1989 a court case hit the news media with dramatic impact. It was the case of Junior L. Davis, Plaintiff, vs. Mary Sue Davis, Defendant, and vs. Ray King, M.D. from the Fertility Center of East Tennessee, A Third Party Defendant. During nine years of marriage the Davises had not been able to achieve natural conception and resorted to *in vitro* fertilization techniques at the Fertility Center of East Tennessee. After several attempts had failed,

> On December 8, 1988, nine ova were aspirated from Mrs. Davis, nine ova were inseminated with Mr. Davis' sperm ... and the nine ova were fertilized. The zygotes were permitted to mature under laboratory conditions, variously developing from the four-cell cleavage stage to the eight-cell cleavage stage.... On December 10, 1988, two of the embryos were implanted in Mrs. Davis, neither of which resulted in pregnancy, and the remaining seven embryos were placed in cryogenic storage for future implantation purposes. (1)

In the next few months the marriage of the Davises came to an end. Mr. Davis sued for custody of the frozen embryos in order to destroy them, and Mrs. Davis responded since she wished to keep them either for implantation in herself or for donation to the Fertility Clinic for the use of others. On September 21, 1989, W. Dale Young, Circuit Judge of the Fifth Judicial District, Tennessee, handed down his decision vesting temporary custody of the seven embryos to Mrs. Davis. In early 1990, Mrs. Davis, now remarried, declined use of the frozen embryos for herself and stated her intention of donating them to the Fertility Clinic.

What is of interest for us here is the reasoning used by Judge Young in arriving at his conclusion. Quite independently of whether we might agree with his decision or not, his approach provides striking examples of what it means to bog down in the Word Maze, based on words that we have discussed in previous columns. The following references are taken from "Findings of Fact and Conclusions of Law, an Appendix to Opinion of the Court."[1]

1. *"That determination is to be made by the answer to the most poignant question of the case: When does human life begin?"* This is, however, not a question at all. The zygote is human, i.e., it is characterized by human genetic material. The zygote is alive, i.e., it shows the characteristics of being alive at its stage of biological development by growth from single cell to multiple cell form. Human life evidently begins at conception.

2. *"Are the embryos human?"* Certainly the embryos are human. They are as human as any creature can be at their stage of biological development.

3. *"Does a difference exist between a preembryo and an embryo?"* This question exercised the Court to a considerable extent and we will say more about it below. A reference in Appendix C of the document says the following:

> Preembryo: The human entity existing before the passage of fourteen days of development, prior to attachment to the uterine wall and the development of the primitive streak. The term is used by some to distinguish a difference between a zygote in its early stages and an embryo in its later stage.

4. *"Are the embryos beings?"* This is a difficult question to answer indeed, unless we specify what is meant by "beings." Embryos are living, human creatures; if this is sufficient to define "being," then embryos are beings. But the implication behind the use of the word "being" is usually equivalent to speaking of a "person." If that were the implication, then embryos are not beings, i.e., not persons.

5. *"Three of the experts, however respectfully disagree with Dr. Lejeune that the human embryos are in 'being;' that is, in 'existence; conscious existence; as, things brought into being by generation ...' or living, alive. The three experts insist that the entities are at a stage in development where they simply possess the potential for life."* This particular comment confuses "being," "existence," "conscious existence," and "alive." There is no question about whether the frozen embryos are "in conscious existence;" clearly they are not since the organs necessary for conscious existence are not present. There is also no question but that they are alive, and not merely in possession of the potential for life. Hidden behind all of these words is the unstated question of "personhood." It is also clear that the frozen embryos are not persons, but have the potential for developing personhood in the future given the proper environment.

6. One of the experts, Prof. John A. Robertson, is quoted as saying *"... at about 10-14 days, the preembryo attaches itself to the uteran wall, develops its primitive streak and life then commences."* Again special significance is being attributed to the word "life" that goes well beyond what it means to be alive.

7. By contrast, another of the experts, Dr. Jerome Lejeune, is quoted as saying, *"When the first cell exists, all the 'tricks of the trade' to build itself into an individual already exist. Shortly after fertilization at the three-cell stage, a '... tiny human being ...' exists ... As soon as he has been conceived, a man is a man."* Here the potential to develop into an individual person is equated with being a "tiny human being." Now this raises no problems if "a tiny human being" is taken literally; for the zygote is "a tiny human being." But it is by no means "a tiny human person," and that seems to be the impact of the words used here.

8. A statement by the Ethics Committee of the American Fertility Society as quoted in the Opinion of the Court makes a real contribution to the issue and is consistent with the kind of position that we have tried to clarify in previous Word Maze considerations.

> A third view—one that is most widely held— ... holds that the preembryo deserves respect greater than accorded to human tissue but not the respect accorded to actual persons. The preembryo is due greater respect than any other human tissue because of its potential to become a person and because of its symbolic meaning for many people. Yet, it should not be treated as a person, because it has not yet developed the features of personhood, is not yet established as developmentally individual, and may never realize its biologic potential.

But the Court rejects this position on the following grounds: *"The Court has made a thorough search of encyclopedias and dictionaries of which the Court may take judicial notice and the Court can nowhere find the word 'preembryo' defined nor can the Court find even a reference to that term."*

It is clear that the term "preembryo" has been selected by the Committee to take account of the intermediate phase between fertilization and implantation, in order to emphasize the critical role of the implantation step to enable future development of the potential for personal human existence. But the Court chooses to ignore it on the grounds that no encyclopedias or dictionaries refer to it. In fact the Court goes still further: *"The Court finds and concludes there is no such term as 'preembryo'; that to use the term in the context of this case creates a false distinction, one that does not exist. The Court finds and concludes the seven cryopreserved entities are human embryos."* But this appears to miss the point that the use of such words as "life," "alive," "human," "being," and "embryo" resolves nothing unless agreement is reached on what these words mean, and unless it is perceived that none of these words expresses the personhood of either the embryo immediately before implantation or of the embryo immediately after implantation.

9. The Court is not alone in this confusion. Mr. Davis asserts *That the embryos do not constitute life, but have the potential for life.*

10. The Court states further: *"The argument that the human embryo may never realize its biologic potential ... is statistically and speculatively true, but is a hollow argument."* The Court then goes on to argue that because a newborn baby may not realize its potential, or because a newborn baby cannot survive without someone taking care of it, we do not dispute that the baby is a human being. But this argument misses the point that the newborn baby is at a stage of biological development far more advanced than that of the pre-implantation embryo; the baby's very closeness to the full development of that potential to be a human person demands that the baby receive the utmost care in being enabled to complete that development.

11. *The answer then, to the question: When does human life begin? "... the Court finds and concludes that human life begins at the moment of conception; that Mr. and Mrs. Davis have accomplished their original intent to produce a human being to be known as their child."* The Court is right: Human life does begin at conception. But it does not follow that the pre-implantation embryo is a human being—if the word "being" is used, not to mean simply an existing entity, but, as appears to be the case here, to mean a human person, a child.

In the cross-examination of Dr. Jerome Lejuene by Mr. Charles Clifford, the following entries are found in the court transcript. I suppose that there is no more appropriate way to end this discussion of frozen embryos—or for that matter to end this series on the "Word Maze," than to quote this section of the transcript.

Q. I take it, Dr. Lejeune, from your testimony that you would be opposed to abortion.
A. Oh, I dislike to kill anybody. That is very true, sir.
Q. I take it, again, your basis of that belief would be that the fetus or embryo is an early human being?
A. Exactly. If it was a tooth, I would not worry about it.
Q. What is this?
A. Well, from here I suppose it's an egg, but I'm not sure.
Q. Let me get a little closer.
A. It looks like an egg.
Q. It's an egg?
A. It looks like.
MR. CLIFFORD: Thank you, Doctor, I thought you were going to tell me it was an early chicken.
THE WITNESS: Oh-
Q. All right. Let's talk about the difference for a moment. If I had in this hand a live chicken, would you agree with me if I were to take it and squeeze its head that it would feel pain?
A. Oh, probably.
Q. That it will be frightened?
A. Yes.
Q. And it would suffer psychological, if you can use that term with a chicken, stress?
A. I'm not competent in psychology, ... and especially not about chickens.
Q. But if I take this egg and assuming it is fertilized—and I wouldn't really do this—but if I were to crush it in my hand, this egg would not feel pain, it would not be aware in the slightest of what was happening to it?
A. Yeah. But it would still be a chicken and only a chicken.
Q. I thought you told me it was an egg?
A. You told me it was a chicken.
MR. CLIFFORD: No further questions.

Thanks for your patience! I hope that I've challenged you to think a little more carefully about what critical words mean and how we use them. Don't WORDs aMAZE you? ❄

[1]No. E-14496. In the Circuit Court for Blount County, Tennessee at Maryville, Equity Division (Div.I). Junior L. Davis, *Plaintiff*, v. Mary Sue Davis, *Defendant*, v. Ray King, M.D., d/b/a Fertility Center of East Tennessee, *Third Party Defendant*, "Custody Dispute Over Seven Human Embryos." Includes the Opinion of the Court, and the testimony of Dr. Jerome Lejeune. Copies may be ordered at cost for postage and handling from: Center for Law & Religious Freedom, 4208 Evergreen Lane, Suite 222, Annandale, VA 22003.

Editor's Note:

In the last issue's "Penetrating the Word Maze" (September 1990), the end of the first complete paragraph on page 186 should have read:

"Although a Christian could accept the biblical doctrine *of Creation and be open to the biological theory of evolution as a description* of God's creating activity, a Christian can respond to Evolutionism only with rejection."

The words in italics were inadvertently omitted.

Book Reviews

THE GOD WHO WOULD BE KNOWN: Revelations of the Divine in Contemporary Science by John M. Templeton and Robert L. Herrmann. San Francisco: Harper & Row, 1989. 412 pages, index. Hardcover; $19.95.

John M. Templeton is known best as an international financier—compiling the Templeton Growth Fund, the Templeton World Fund and others. In recent years, he has demonstrated his interest in science by selecting Stanley Jaki and Thomas Torrance as recipients of the annual Templeton Prize for Progress in Religion. Perhaps less well-known is his intellectual portfolio of a wide range of scientific and religious publications—a fact that first came to my attention when I noticed that his earlier book (*The Humble Approach*: New York: The Seabury Press, 1981) contained a 116 page bibliography. An ASA member, Mr. Templeton has teamed up with ASA Executive Director Bob Herrmann to write this book.

"This is a book about signals of transcendence," the authors say in chapter one, "about pointers to the Infinite that are coming to us not from mystics but instead through the most recent findings of science." When science was celestial mechanics and immutable laws, God became difficult for many scientists to believe. But the uncertainty principle in physics and the anthropic principle in biology reversed that trend. They continue, " ... something has been happening in the past few decades of this century. Science appears to be leading us back to a profound respect and an expansive attitude toward nature. God's activity has been seen to be far more open-ended and immediate than the clockwork image would allow."

Chapter two is "Science Expands Our Understanding of Nature and Reality." Here they explain how changing paradigms made "Nature and supernature split apart," and how newer paradigms make the two realms less mutually hostile. "Einstein's God takes on some of the biblical character of the Giver of Light, the Great Revealer, who rejoices when any of the vast truth of the creation is brought to light and obeyed in humility."

Other chapters include: Recent Scientific Contributions to Meaning and Purpose in the Universe, God Reveals Himself in the Astronomical and in the Infinitessimal, The Vast Unseen and the Genetic Revolution, Deep and Powerful Ordering Forces in the Universe, The Vast Arena of Faith, The Remarkable Evolution of Mankind, Mysteries Multiplied, and God and the Future.

The book's content is made even more palatable by the frequent use of well-turned phrases—some original, others compiled from two lifetimes of copious reading. For example, they quote the late Donald MacKay, saying, "The God in whom the Bible invites belief is no 'Cosmic Mechanic.' Rather is He the Cosmic Artist, the creative Upholder, without whose continual activity there would be not even chaos, but just nothing."

Much of the book's content appears in other sources, usually scattered and written in varying degrees of academic jargon. This volume is comprehensible to the undergraduate and may be useful as a text in philosophy of science. It and Hugh Ross's *The Fingerprint of God* might be suitable vehicles to fulfill an aspiration of Richard Bube's: "I wish we had a routine course on science and Christianity in the seminary curriculum."

Reviewed by David Fisher, Editor, Radio Academy of Science, Wheaton, IL 60187.

PHYSICS, PHILOSOPHY, AND THEOLOGY: A Common Quest for Understanding by Robert John Russell, William R. Stoeger, S.J., and George V. Coyne, S.J. (eds.). Notre Dame, Indiana: Notre Dame Press, 1989. 408 pages, index. Cloth; $30.00. Paper; $14.95.

This book consists of most of the papers (eighteen out of twenty-one) presented at a September 1987 conference at the Papal Summer Residence at Castel Gandolfo, a later message of John Paul II, as well as additional ideas that resulted from a meeting at the Center for Theology and the Natural Sciences in Berkeley in January 1988. Fifteen of the participants came from the United States or the United Kingdom, with three from Italy, and one each from Canada, Denmark and Switzerland. One of the editors tells us in the Preface, "Each and every part of this book, including, in my opinion, the Papal message, is exploratory."

In his special remarks (printed with a different text layout and paper quality from the rest of the book), John Paul II sets forth a moderate approach, "Science can purify religion from error and superstition; religion can purify science from idolatry and false absolutes."

The eighteen papers of the volume are divided into three major sections: (1) Historical and Contemporary Relations in Science and Religion, in which seven authors discuss the historical interaction between science and theology, the possiblity of natural theology today, and related topics; (2) Epistemology and Methodology, in which three authors discuss topics related to realism and myth; (3) Contemporary Physics and Cosmology in Philosophical and Theological Perspective, in which eight authors explore implications of modern science for theology, especially in the areas of cosmology and quantum physics.

It took me many months to read through this book; it is difficult material and often written in a difficult style. Much of the early material is helpful and serves to warn against excesses and extremes. Ian Barbour of Carleton College concludes his paper, "Christianity should never be equated with any metaphysical system" (p. 45). Ernan McMullin of Notre Dame University summarizes his paper by saying, "One clear moral would seem to be that physico-theology is not to be trusted .... I am persuaded that this attempt to bring about a rapprochement between the quantum theory of measurement and Eastern religious cosmologies does justice to neither" (pp. 71, 72). Michael Buckley, National Council of Catholic Bishops, concludes his paper with the words, "in turning to some other discipline to give basic substance to its claims that God exists, religion ... is admitting an inner cognitive emptiness. ... Inference cannot substitute for experience, and the most compelling witness to a personal God must itself be personal" (p. 99).

Nicholas Lash, Divinity Faculty at Cambridge, has written an excellent and perceptive paper, "Observation, Revelation, and the Posterity of Noah," with such quotable statements as, "I am simply protesting against the fatuous illusion that we could discover or come across God as a fact about the world" (p. 209), or, "Fundamentalism is not as is sometimes supposed, an anachronistically surviving precursor of modern rationalism, but a byproduct of it" (p. 210), or "We are as close to the heart of the sense of creation in considering and responding to an act of human kindness as in attending to the fundamental physical structure and initial conditions of the world" (p. 213).

Such temperate opinions do not dominate everywhere in this book, and particularly in the third major section. Here Sallie McFague of Vanderbilt University develops an evolutionary model of God as mother, which leads her to conclude that God is "the mother of her own body" (p. 261), but she does admit in closing that "this theology 'says much,'" but "it 'claims little'" (p. 262). John Leslie from the University of Guelph considers "How to Draw Conclusions from a Fine-Tuned Cosmos," and concludes that "the God hypothesis has no advantage over multiple worlds" (p. 310). Perhaps the furthest departure from biblical Christianity comes in Frank Tipler's further exploration of the anthropic principle and his "model of an evolving God," which he infers from "the naturalistic ethical postulate that it must be possible for life never to die out in the universe" (p. 326).

In the final subsection that focuses particularly on the implications of quantum theory for theology, the nine-page chapter by John Polkinghorne of Cambridge stands out as a gem, a succinct assessment of the issues involved. He concludes with a summary of what quantum theory does not do, which ought to be must reading for all those who would see some revolutionary theological insights being gained from science: "it does not license the attitude that anything goes," it "is not of itself a sufficient basis for a universal metaphysics," it "does not endorse the essential rightness of Eastern religious thought," and it "does not approve the idea of an observer-created world" (pp. 340, 341).

This is a book that could profitably be studied in a group including people with some maturity in science philosophy and theology, who could meaningfully distinguish between some of the extremes that are presented.

Reviewed by Richard H. Bube, Professor of Materials Science and Electrical Engineering, Stanford University, Stanford, CA 94305.

THE WORLD WITHIN THE WORLD by John D. Barrow. New York, NY: Oxford University Press, 1988. 398 + xiv pages with preface, select bibliography, and index. Hardcover.

Are there laws of nature? If so, are they objective realities, or simply ways in which we try to organize our experience? Is it possible that ultimately there are no laws? Working scientists have instinctive answers to such questions in the philosophy of science, but usually give them little thought. Barrow, a lecturer in astronomy at the University of Sussex, deals with such qustions as a working scientist interested in, and familiar with, philosophical issues. He discusses intelligently the theological matters which are encountered, though these are not his major concern here.

The first chapter sets out some fundamental concepts. Possible views of science—empiricism, operationalism, idealism, and realism—are presented, with critical comments. Barrow intends to "subscribe to the 'common-sense' realist view until we run into definite evidence against it," adding, "Almost every working scientist is a realist—at least during working hours" (p. 16). He will point out that quantum theory does pose problems for realism. A realist understanding is still possible, though introducing something like the many-worlds interpretation of quantum theory to maintain it carries us out of the "common-sense" realm.

Chapters 2 and 3 sketch the development of science from Hebrew and Greek beginnings through quantum theory. Barrow argues that the biblical tradition did not contribute directly to the development of science, but that by elimination of mythological world-views and insistence upon God as the supreme lawgiver, it provided a background for the rise of science. He contrasts this with the stillbirth of Chinese science, and brings that theme up to date with criticisms of attempts to link quantum theory with Eastern mysticism.

"Inner space and outer space" (Ch. 4) describes today's understanding of elementary particles and scientific cosmology and the linkages which exist between them. These adumbrate a world-view which is both scientific and

wholistic, and to be differentiated from the *a priori* wholistic views of mysticism, in which science was unable to develop. The book's title is echoed in that of a section introducing the atomic idea, but also refers to the three "worlds" of Popper (physical objects, states of consciousness, and objective knowledge) in Chapter 1. The problem of the unity of the universe involves attempts to provide a unified description of it ("theory of everything") *and* attempts to show how our mental states are correlated with the external world.

"Why are the laws of Nature mathematical?" (Ch. 5) must be asked, for our formulations of them assuredly *are* mathematical. Barrow discusses different concepts of the nature of mathematics, together with ideas of computability and chaos which computer science has made available, and concludes with the suggestion that the mathematical character of natural laws is related to their having an "optimal coding" which makes it possible for the same message about nature to be deciphered by us in spite of noise.

But "Are there any laws of Nature?" That basic question is confronted in Chapter 6. One can imagine chaotic universes in which apparent order emerges randomly. Even if laws describe most of our experience, the existence of space-time singularities—as in black holes or the Big Bang—means that space-time is incomplete.

The final chapter, "Selection effects," deals with ways in which humans pick out particular phenomena and types of order, and with the need to penetrate behind those selection effects. Kuhn's view, which sees the development of science essentially as a sociological phenomenon, is rejected. But the co-author (with Tipler) of *The Anthropic Cosmological Principle* views that priniciple positively, and responds to some criticisms of it. He moves explicitly onto theological ground to ask whether the Anthropic Principle is an argument for the existence of God, and concludes that it is not, though the two ideas are compatible. Possible linkages with christological eschatology ("theanthropic principle") are not explored.

The fact that we experience only one world makes testing even a good "theory of everything" problematic. Such a theory might be true but untestable, leaving us essentially with a decision of faith to make. And that is the conclusion about laws of nature: "Sight must give way to faith" (p. 373).

This is a fine book, and limitations of space here require the omission of any discussion of many of its insights. Though physics is sketched from the ground up, the degree of sophistication keeps it from being "popular" in the usual sense. But I hope that this, and the presence of some equations, will not scare off those without scientific training. *The World Within the World* deals well with some very basic questions about the nature of reality, and it will be worth the time of anyone interested in such questions to read it carefully.

Reviewed by George L. Murphy, Pastor, St. Mark Lutheran Church, Tallmadge, OH 44278.

JESUS: Lord of Space and Time by Lambert T. Dolphin. Green Forest, AR: New Leaf Press, 1988. 271 pages. Paperback; $7.95.

This book, written to Christians not in science, is a collection of ideas about both the Bible and its relationship to the physical world. Most topics center around the relation of space-time to eternity. The book is unusual in that the author willingly admits that much of what he puts forth is speculative, inherently perplexing, and subject to further scientific analysis. His goal is summed up this way: "I, for one, will feel rewarded if I have stimulated a new look at the world even if a number of my assertions prove later to have been incorrect or incomplete" (p. 218).

In particular, two broad science themes are discussed. The first is the controversial idea, proposed by Norman and Setterfield (see *ASA/CSCA Newsletter*, OCT/NOV 88, p. 5) that the speed of light has decayed exponentially with time. If true, this would provide a young-earth explanation that takes into account the appearance of an old universe. In this hypothesis, gravity clocks (consistent with Genesis 1) are unaffected by c-decay but atomic clocks are not. Consequently, the universe is contracting, is less than 8000 years old, and is not the result of a Big Bang.

The second major theme is that the space-time of eternity (spiritual) is distinct from our created space-time. This idea is developed further in the context of the doctrine of last things. In death, there is no soul-sleep because we arrive in eternity along with others who have died at the same time (though our deaths here were at different times). The ideas here are similar to those of Donald MacKay, though developed independently.

Several assumptions underlie the theological context shaping the author's scientific view. First, reality consists of two levels of creation (physical and spiritual) with a Platonic relationship; heaven is real and the earth a shadow, fading away (by the second law of thermodynamics). The spiritual is like the physical; for example, spiritual light is the basis for physical light. Spiritual force holds atoms together. The two worlds are similar in that "we do not know how to formulate scientific laws to describe the interactions between these two realms" (p. 171). This sounds like mysticism, but I sense that the author is exploring the problem of how the spiritual can have an effect on the physical. This is an issue because of their assumed dualistic relationship at the same ontological level; no scheme with multiple levels of meaning (such as the two levels of a physical sign and its non-physical message) is given.

Second, a somewhat deistic view of God's relationship to Creation is assumed (pp. 44, 45) though God also presently sustains it (pp. 50, 51). The world is programmed by God to "continue without His constant on-going interference, which would show up immediately as violations of the known laws of physics" (p. 201). God employs a kind of spiritual technology to affect the physical

universe. Thirdly, it is assumed that the Bible speaks to modern scientific theories (cosmology in particular).

Besides these ideas are many others of a less controversial nature. The author believes that science and revelation are basically in harmony and that the universe is orderly. Scriptural quotations and commentary on them abound throughout the book. Many biblical insights are attributed to Arthur Custance and Ray Stedman. This book will be of interest primarily to those desiring to "brainstorm" about possibilities that lie beyond settled scientific and theological knowledge.

Reviewed by Dennis Feucht, Innovatia Labs, West Linn, OR 97068.

DOES GOD PLAY DICE? THE MATHEMATICS OF CHAOS by Ian Stewart, UK: Basil Blackwell Ltd, 1989. 317 pages, index. Hardcover; $19.95.

Chaos is a hot topic these days, as evidenced by the explosion of scientific and popular literature devoted to the subject. No longer restricted to mean a formless primordial condition or other state of disorder and confusion, in modern scientific parlance the term chaos has become associated with the complex, apparently stochastic behaviors produced by some deterministic systems. In this book, Ian Stewart provides a mathematician's view of the history of ideas which has led to this new, expanded understanding of dynamical systems. Contrasting this book with another recent popular account of chaos (*Chaos* by James Gleick), I would say that while Gleick provides a more thorough account of the personalities involved in the emerging science of chaos, Stewart offers a better exposition of the fundamental concepts. And these concepts are explained in an entertaining and intuitive fashion, without recourse to the formal rigors of advanced mathematics.

The book is nicely produced and easy to read. The 124 figures (all black and white) serve to illustrate the concepts under discussion. In keeping with the popular, rather than technical, tone of the book, detailed citations to the work discussed are not provided, but a brief list of further readings is furnished. The only substantive error I detected is in Figure 117, in which the raw data are on the right and the power spectra on the left, despite the caption indicating the reverse.

The book begins by considering the scientific mindset which prevailed prior to the discovery of chaos. On one hand, the clockwork universe of Newtonian mechanics: simple, predictable. On the other hand, the world of chance and statistics: random events, unpredictable in detail, with regularity appearing only in average quantities. Two world-views, and no middle ground.

The deficiencies of the established view were perhaps first clearly perceived in the nineteenth century by the French mathematician Henri Poincaré. Working on a classical problem of Newtonian mechanics, the dynamics of three bodies interacting by gravitation, Poincaré invented a new branch of mathematics (topology) and glimpsed a new world of exceedingly complex, and ultimately unpredictable, behavior.

But the study of dynamical chaos did not flourish until our own time, with the advent of the computer making it possible to more clearly visualize and explore this complex realm. Stewart considers the significant contributions made by persons such as Stephen Smale (a topologist), Edward Lorenz (a meteorologist), and Mitchell Fiegenbaum (a physicist). He examines the application of chaos theory to an almost bewildering array of phenomena, including turbulent fluid flow, gaps in the asteroid belt, the tumbling of Saturn's moon Hyperion, a dripping faucet, population dynamics, epidemic outbreaks, and the beating of the heart. In the course of this broad survey, such important concepts as strange attractors, sensitive dependence on initial conditions, quasiperiodicity, phaselocking, renormalization, universality, and fractals are introduced.

In the final chapter, Stewart offers some informal musings on the limits of predictability and the nature of chance. Chaos may spell the end of Laplace's dream of a vast intellect which, given an appropriate set of initial conditions, is capable of completely predicting all past and future events. Yet, to Stewart and others, chaos suggests the possibility of a new sort of determinism. Complex, apparently stochastic behavior can arise naturally in simple, deterministic systems. Perhaps true randomness, in the sense of non-deterministic behavior, does not exist.

It should be said that the book's title is somewhat misleading in two respects. First, it alludes to Einstein's famous aversion to the idea of a dice-playing God. Yet, for Einstein, this image arose in the context of quantum uncertainty, not in the world of complex macroscopic dynamics which is the principal focus of chaos theory. The issue of quantum uncertainty is considered only briefly in the last chapter, and the suggestion that chaos may play a pivotal role in resolving Einstein's dilemma is at the moment, as Stewart admits, "pure speculation." Second, the word "God" in the title, and throughout the book, serves primarily as a euphemism for "the natural world" or "the laws of nature." Although Sterwart speculates about a determinism which incorporates the rich dynamical possibilities of chaos, the implications for such classic problems as the existence of free will or the nature of God and divine activity in the physical world are not even broached. Readers wishing an insightful, entertaining, non-technical introduction to the mathematics of chaos will be delighted by Stewart's book. Readers desiring a serious consideration of the philosophical and theological issues raised by the title will have to look elsewhere.

Reviewed by Alan R. Johnson, Postdoctoral Researcher, Department of Biology, University of New Mexico, Albuquerque, NM 87131.

DOES GOD PLAY DICE? A Look at the Story of the Universe by John Houghton. Grand Rapids: Zondervan Publishing House, 1989. 160 pages, index. Paperback.

Drawing the title from a well-known statement from Einstein, the noted British scientist, John Houghton, has written a brief discussion of the relationship between Christianity and modern science. The theme of the book can best be summed up in this statement from the preface.

> In order that we be whole human beings, I believe that different parts of our lives should relate together in an integrated way. The exploration of this book brings together, so far as I am able, two important strands of my life—namely my experience and career as a physicist and my experience as a Christian believer.

The book is divided into twelve chapters on topics ranging from the "The Big Bang and All That" to "Waves, Particles and Incarnation." Various scientific topics are interwoven with religious and theological concepts with both areas discussed in a fair and objective manner. Houghton relies heavily upon the writings of C.S. Lewis and Donald MacKay. This is especially apparent for example, in his criticism of reductionism in science.

Probably the most interesting part of the book is the discussion of the "fifth dimension analogy." The author begins with the concept of a scientific model and then moves toward a discussion of the spiritual realm. He correctly identifies the difficulties which humans living in a finite, four dimensional world (three dimensions in space plus time makes four dimensions) have in understanding a being without such limitations of space and time. Houghton uses an analogy taken from a book written in the 1880s by Edwin Abbot called *Flatland*. In the book, Abbot described an imaginary world with only two dimensions. The inhabitants of this world are confined to movement only in one plane and have no knowledge of anything outside of this plane. A sphere from Spaceland visits Flatland and tries to explain to the inhabitants what it means to live in a three dimensional world.

The sphere may pass through the plane, be a part of the plane and also be outside of the plane at the same time. To Houghton this is analagous to God's relationship with the physical world. As he states,

> In a similar way, with the analogy of an extra dimension, we can imagine God in the spiritual dimension being outside the material universe yet being all-seeing and all-knowing regarding events within it, and having the ability to be present anywhere within it.

I found the book to be interesting and encouraging to me as a scientist-Christian. Houghton has excellent scientific credentials. He is currently Director General of the Meteorological Office of England and has been professor and head of the Department of Atmospheric Physics at Oxford University. Yet, he has written this book in an unashamed manner of respect for biblical principles.

This is a small and inexpensive book and would be quite suitable as a gift for someone who is seeking to understand the relationship between science and Christianity. The one, perhaps not negative but at least limiting, aspect of the book is the heavy emphasis upon the physical sciences. A person lacking at least a general knowledge of physics would find parts of the book a bit overpowering. Otherwise, I would recommend the book to anyone interested in this topic.

Reviewed by Phillip Eichman, Ball State University, Department of Biology, Muncie, IN 47306-0440.

ASTROLOGY: True or False? A Scientific Investigation by Robert B. Culver and Philip A. Ianna. Buffalo, NY: Prometheus Books, 1988. 228 pages, index. Paperback; $13.95.

Culver and Ianna make a strong case for the need to seriously address the pseudoscience of astrology. The authors successfully do just that in *Astrology: True or False.*

The scientific community has for too long ignored the claims of astrology or, at most, looked at them with either amusement or disgust. In fact, Culver and Ianna tell of being criticized by colleagues for "wasting their time" in writing this book. Not challenging the claims of astrology on scientific grounds has allowed the subject to gain unwarranted respect. It is ironic that the most technologically advanced society in history has been duped by such baseless claims as those in astrology.

Astrology: True or False? is a revision of *The Gemini Syndrome: Star Wars of the Oldest Kind* published in 1979. The book addresses basic concepts in both astronomy and astrology, and integrates the subjects in a way understandable to almost any reader. The authors, although clearly stating in the preface their attempt to disprove astrology, present a balanced picture of the world of astrology. Culver and Ianna do an excellent job of discrediting the claims of astrology (e.g., the famous "Twenty Year Sequence" of U.S. presidential deaths, and the fact that *no* astrologer predicted the stock market crash of 1987). One amusing graphic shows that the gravitational force acting on a child at birth is six times greater by the attending physician (500 times by the hospital building!) than the planet Mars, thus disproving any significance to planetary alignment and therefore any horoscope predictions. The evidence against astrology is also strengthened when the authors show numerous cases where opposite predictions between astrologers are made using the same astrological data. Even the fact that astrology has remained unchanged in the face of hundreds of years of astronomical advancement, including the discovery of new planets (an obvious effect on anyone's horoscope), would seem to make the most ardent follower skeptical.

Culver and Ianna become progressively bolder in their criticism of the claims of astrology, culminating in a chal-

lenge to astrologers to demonstrate the validity of their craft in an objective way by passing any one of ten controlled tests (pp. 210-211).

Astrology: True or False? is probably the most comprehensive source for refuting the claims of astrology. The *Astronomical Society of the Pacific* has selected it as one of the ten best books in 1988. The text is well documented, with the end of each chapter containing referenced material.

My criticisms of the publication are few and somewhat secondary to the overall contribution of the book to the field of astronomy, but it would seem that the publishers could have invested a bit more in the quality of the publication. The binding is simply glued, and my copy is already worn and pages falling out. Line drawings are somewhat oversimplified and the photographic reproduction is poor. The authors also claim that the text is updated. However, I find most of the update in the form of an epilogue (Chapter 16) at the end of the book. Although Culver and Ianna do present current topics, such as Nancy Reagan's serious use of an astrologer, other examples and illustrations in the book could obviously be updated.

Nonetheless, Culver and Ianna have produced a concise but comprehensive treatise exposing the unfounded precepts of astrology. After reading *Astrology: True or False?*the answer to the title of this book is obvious to anyone. Due to the double-edged affront that astrology has on both Christianity and science, we would all do well to have this book as part of our library.

Reviewed by Alfred J. Fleming, Professor, Dept. of Geological Sciences, Olivet Nazarene University, Kankakee, IL 60901.

THE DAWN OF MODERN SCIENCE by Thomas Goldstein. Boston: Houghton Mifflin Company, 1988. 297 pages, index. Paperback.

The author is an historian whose speciality apparently is the Middle Ages and Renaissance. Unfortunately the book provides no information about his educational and professional background. Nevertheless, his writing demonstrates a high level of scholarship and competence in that field.

Goldstein approaches the history of science from a background in the humanities rather than the natural sciences. He brings to his subject a wealth of information and perspective not usually found in histories of modern science. In turn, he acknowledges that his study of the history of science has opened up a world of cultural flavor and color of which he had been unaware.

The book deals primarily with the centuries before Copernicus, who has been viewed as firing the opening guns of the scientific revolution. In other words, the author sets the stage for the important 150 years between Copernicus and Newton. His aim is "to convey a lively, all-around picture of the major currents and their links with surrounding cultural history." Goldstein does not attempt to include all the important names or achievements of science in the Middle Ages and Renaissance; he selects several influential figures, largely unknown, and presents the colorful details.

The first chapter deals with the idea of the earth in Renaissance Florence. The focus is on Paolo Toscanelli, who set up an observatory, made remarkably accurate calculations and observations of the sun's path, and developed a concept of the earth as a globe. He sent a letter to a young man named Christopher Columbus, describing his geographic theories regarding the nature of the globe. Ironically, that is the only manuscript of his many writings that has survived.

Toscanelli's contribution to modern geography consisted of two equally important concepts: an earth in which the whole ocean was accessible to people in their ships, and solid land portions of the whole earth as inhabitable. Credit for exploration breakthroughs by the early Portuguese, Columbus, Vespucci and Magellan, goes largely to him.

Chapter two traces the ancient roots of science in Greek civilization and philosophy. Goldstein notes that histories of science available in today's bookstores fail to relate the evolution of science to the overall historical process; they treat it as a hermetically-sealed development of the mind apart from the ups and downs of life. The author traces the eclipse of Western culture in the fall of the Roman Empire and its revival in the twelfth century Renaissance. In that context he traces the rise, fall and rise again of science. His understanding of culture with its various strains makes fascinating reading. "Western science developed in the seats of Medieval learning, which by the twelfth century were the cathedral schools."

Chapter three sketches the development of science at Chartres where the great cathedral embodied the new thought. It never occurred to those scholars to sever the natural universe from God's world. In their vision, the laws of nature were all encompassed within the divine universe and its design. The cathedral statuaries stand as a visual manifestation of that conception: Christian religion and scientific thought, the world of the Bible and the ancient world of Greece and Rome, the liberal arts and science. That culture reached its full flowering in the 1170s as a handful of men were striving to launch the evolution of Western science. "The abiding fact is that modern science grew out of the lovely Medieval idea of *Ordo Mundi*, the faith in the universal order, a religious feeling for the ultimate unity of life."

In his lectures on Genesis, Thierry of Chartes taught that the story of creation in the Bible was compatible with the scientific approach. He prompted the idea of the gradual "beautification" or "decoration" of the world by God, which some of the Fathers of the Church had already begun to distinguish from the mere act of creation

itself. Under his leadership in the 1140s, the school attracted students from all over the Western world. Thierry stimulated a search for ancient and Arabic scientific manuscripts in Spain. His situation sounds amazingly modern: surrounded by international students, propounding his idea of "continous creation," that is, God's continuing beautification of the world. Someday Thierry will be recognized as one of the true founders of Western science. He courageously advanced scientific thought in the face of his outraged critics, yet he preserved his vision of nature as merely one aspect of the world.

His successor, William Conches, wrote: "to seek the reason of things and the laws of their origins is the great mission of the believer, which we must carry out by the fraternal association of inquiring minds. Thus, it is not the Bible's role to teach you the nature of things; that is the domain of philosophy (science)." He helped launch science as an independent collective enterprise, an intellectual community. The masters of Chartres had a powerful vision that included the whole natural world within the scope of the divine. The house that they built as a philosophical framework for modern science was based on Medieval faith in the all-pervasive spirit of God.

In chapter four Goldstein describes "The Gift of Islam." The rich store of ancient manuscripts discovered by the Arabs became available through military conquest in Spain just as the West was ready to receive them. He sketches the phenomenal rise of Islam as the Arabs conquered the Middle East and North Africa, weaving the various cultural strands together into a new fabric. Islam made its own contributions to science mainly through a host of measuring instruments and observational data. Europe received Arabic science by no means for its own sake alone, but very largely as part of a cultural movement for which Europe was ready.

Succeeding chapters sketch the contribution of Medieval mystics and alchemists, the builders of cathedrals and practitioners of medicine. The author has an excellent chapter on art and science in the Renaissance. During that period artists easily switched from an aesthetic to a scientific approach to the earth and back again. Leonardo daVinci's dual mastery of science and art was not unique; it was embedded in the Renaissance. Although his status as a scientist seems doubtful, his indirect influence in this area was valuable.

As a cultural history, the book provides for study of the new emerging science a rich-textured background that dispels the common misconception of the Middle Ages as a period of marking time until the Renaissance. A weakness in form, however, is the author's tendentious style with frequent sentences of eight to ten sentences in length, whose shortening would have made easier reading.

Nevertheless, Goldstein achieves his purpose of presenting the fascinating cultural soil in which modern science began to flourish. It is especially valuable for those in the natural and social sciences whose education is weak in the arena of cultural history.

Reviewed by Charles E. Hummel, 17 Worcester Street, Grafton, MA 01519.

THE NEW FAITH-SCIENCE DEBATE: Probing Cosmology, Technology, and Theology by John M. Mangum (ed.). Minneapolis: Fortess Press, and WCC Publications: Geneva, 1989. 165 + x pages. Paperback; $9.95.

There are some promising signs that the science-theology dialogue is being taken seriously as part of the agenda of mainline churches today. The present volume is one sign of that interest. It contains the papers and recommendations of the 1987 Cyprus consultation on the dialogue sponsored by the Lutheran Church in America and the Lutheran World Federation. The papers give a good introduction to the area by an international group.

The papers begin appropriately with a sketch of the modern scientific picture of the world by Bengt Gustafson, a Swedish astrophysicist, and an attempt at integration of science and Christian theology by the biochemist and Anglican priest Arthur Peacocke. This attempt is made from a process theology standpoint and has the strengths and weaknesses of that approach. Vitor Westhelle, a Lutheran Pastor from Brazil, looks at the issues from a Latin American position and suggests that education about science and technology is really part of the Church's task of helping to liberate people. A German involved with environmental concerns, Gerhard Liedke, gives an interesting typology of ways in which churches have related to the world, and the late American theologian Harold Nebelsick describes the modern mission of the Christian Church in Reformed terms.

"High-tech" and its impact on American society are described by Judith Larsen, a research scientist in this area, while the specific challenge of genetic engineering is discussed by the theologian Ronald Cole-Turner. His discussion of the idea of "co-creation," with the argument that human activity must serve the will of God as it has been shown to us in Jesus Christ in order to qualify as co-creation in a theologically meaningful sense, is valuable.

In recent years there has been a good deal of discussion of possible relationships between Asian religions and the scientific picture of the world. Here a Japanese Lutheran theologian, Naozumi Eto, offers some insights on this issue. This is followed by discussions of science as a Christian vocation by a biochemist from Cameroon, Vincent P.K. Titanji, and an American theologian, Ted Peters. The summarizing remarks, by physicist and theologian Robert John Russell, are quite helpful. His arguments against overemphasizing the sociological ele-

ment in the development of scientific theories need to be heard today. And Russell brings out the important fact that we do not have to settle simply for a "science-theology dialogue" (though that may be a convenient shorthand expression), but with a four-way conversation between science, theology, technology, and ethics.

Six daily Bible studies by Paulos Mar Gregorios provide important theological insights for this conversation from the Eastern Orthodox tradition. That tradition has not always been attended to very well in western discussions of religion and science, and it is good that the globalization of those discussions is bringing it into greater prominence. The book concludes with some results from an international roundtable and several regional groups.

One might at first wonder about the title of the book. Are we to continue with old-fashioned confrontations between faith and science? But the title is well-chosen. There is indeed "debate"—all of the partners in the theology-science-technology-ethics conversation present some challenges for the others. But the focus here is on the "new" aspect of the debate—new issues brought about by scientific and theological developments, and also a new attitude of mutual respect maintained even when significant differences and challenges are seen.

This book provides a good introduction to this modern conversation. If you know leaders in the church who do not really see the importance of the conversation, you could do a lot worse than to get them to read *The New Faith-Science Debate.*

Reviewed by George L. Murphy, Pastor, St. Mark Lutheran Church, Tallmadge, OH 44278.

THE LONG WAR AGAINST GOD: The History and Impact of the Creation/Evolution Conflict by Henry M. Morris. Grand Rapids, MI: Baker Book House, 1989. 344 pages, subject, name and scripture indices. Hardcover.

Henry Morris, president of the Institute for Creation Research, is well known to *Perspectives* readers as a long-time leader in the creation/evolution debates for more than 40 years. He received a Ph.D. from the University of Minnesota and among various teaching positions served as Chairman of the Civil Engineering Department at VPI for 13 years. Morris has been a prolific writer and among his many books are *The Genesis Flood, Scientific Creationism,* and *The God Who is Real.*

The book's thesis is that the creation/evolution conflict is not just a scientific controversy, not just a battle between science and religion, but an agelong conflict between world views. Ever since Satan's rebellion, his "long war against God is founded upon the premise of evolution and is implemented through a wide-ranging variety of applications of evolutionism in every area of human thought and life" (p. 304).

Denial of God has always been the cause of all human problems. Evolutionism, which Morris views as essentially synonymous with atheism, naturalism, humanism and materialism, provides the philosophical basis for denial and rebellion against God. "The ancient universal 'world religion' of evolutionary pantheism was first introduced at Babel by Satan ... then carried around the world by the dispersed immigrants from that wicked city" (p. 257). Evolution is the world's religion and evolutionary cosmogonies have dominated most of the world since the sixth century B.C.

The all-pervading influence of evolutionary thinking and philosophy is developed in six chapters which have very descriptive headings: The Evolutionary Basis of Modern Thought; Political Evolutionism—Right and Left; Evolutionist Religion and Morals; The Dark Nursery of Darwinism; The Conflict of the Ages; and The Everlasting Gospel.

Morris has taken a somewhat more charitable tone in this book than in some of his other books: " ... I am not suggesting that any particular person who believes in evolution is therefore 'evil' or immoral. The only issue is the evolutionary philosophy itself, not the people who believe it." In the first three chapters Morris details the worldwide impact of evolutionism, including Marxism, Nazism, communism, humanism, racism, abortion and the general decline of morality. For example, Hitler himself became the supreme evolutionist and Nazism the ultimate fruit of the evolutionary tree. Although Morris has indeed taken a more charitable approach, ASA has been singled out for its compromising position: "Its supposedly 'intellectual' approach has undoubtedly been significantly responsible for the widespread defections of evangelical colleges and seminaries" (p. 106).

Chapters four and five trace the history of evolutionary theory. In his discussion of Darwin's *Origin,* Morris marvels that a book which had no original ideas and "is most notable for its complete lack of documentation," "could have so profound an influence on the subsequent history of human life and thought" (p. 156). Morris has put forth a significant effort in this section of the book and I find it a valuable addition to the creation/evolution debate.

The final chapter reemphasizes the main point made throughtout the book that commitment to evolutionary theory is not made on a scientific basis but from commitment to a particular world view. Morris maintains that evolutionary theory has provided "the pseudo-rationale for all that is false and harmful in the world." In contrast, special creation is the most certain truth of science and Christ's resurrection is the best-proved fact of history.

After having read many of Morris's books, I find this one adds some new and significant contributions to the creation/evolution debate. Morris continues to use terms like "hard data," "real data" and "genuine data" of science which support creation and do not support evolution. Nevertheless, I find the tone of this book more charitable

at least toward individuals (if not toward the ASA) who may disagree with him. In my opinion this book contributes something more than rhetoric to the creation/evolution debate and is worth reading, even if you strongly disagree with Morris.

Reviewed by Bernard J. Piersma, Houghton College, Houghton, NY 14744.

ANTI-EVOLUTION: An Annotated Bibliography by Tom McIver. Jefferson, North Carolina: McFarland and Company, 1988. 385 pages, indexes. Hardcover; $39.95.

This book contains an annotated bibliography of more than 1850 books, tracts, pamphlets, and a few audiovisual materials on the general subject of evolution and creation. The author defines the subject area as "anti-evolution" and includes not only Protestant and fundamentalist works, but also anti-evolution works written by members of other religious groups (i.e., Catholic, Jewish, and Islamic) and several nonreligious challenges to the theory of evolution.

The author has written objective and nonpolemical annotations for most of the works cited. These annotations include information on the author, such as academic training, affiliation (i.e., university, etc.), occupation, and religious affiliation, as well as a brief explanation of the type of approach taken by the author (e.g., strict creationism, Gap-Theory, catastrophism, etc.).

The book also has 60 pages of extensive indexes. These are arranged by name, title, and subject and make the book much more useful.

The cost of the book is somewhat prohibitive for most individuals, but the book would make a valuable addition to college and university libraries. Anyone interested in this subject will find this to be a very useful and interesting resource.

Reviewed by Phillip Eichman, Ball State University, Biology Dept., Muncie, IN 47306-0440.

THE GENESIS SOLUTION by Ken Ham and Paul Taylor. Grand Rapids, MI: Baker Book House, 1988. 126 pages, subject and scripture indexes. Paperback; $6.95.

Ham and Taylor believe that the major events of Genesis (creation, the fall, the tower of Babel, and Noah's flood) are foundational to all of Christianity, and that if our foundation is weakened or destroyed, then everything built upon it suffers the same fate. They state that evolutionary theory is a direct attack on Genesis, and encourage Christians to stop shooting (1) at each other, (2) into nowhere, (3) at individual issues, or (4) at their own foundation, thus helping the evolutionists blast away our Genesis foundation. Instead, Christians are to use "Creation Evangelism," which clears away the "thorny, rocky ground of evolutionary philosophy" and lays a foundation of literal interpretation of Genesis before sharing the good news of Christ's birth, death, and resurrection. Ham and Taylor recommend Henry Morris's *The Genesis Record* "as the single best and most accurate guide to Genesis."

The Genesis Solution deals with more than the usual creation/evolution battle over the origin of life and its major forms. Ham and Taylor believe that most Christians misunderstand the nature of the creation/evolution conflict. They state early in the book that evolutionary theory is the common foundation for our cultural acceptance of homosexuality, abortion, premarital and extramarital sex, easy divorce, pornography, agnosticism, atheism, Secular Humanism, and the removal of God from public education and civic events. The Genesis remedy they propose for sex, marriage, the home, parental responsibilities, and clothing and modesty is offered in a positive, common sense way.

In the chapter "Did God Use the Evolutionary Process," Ham and Taylor critique the Day-Age, Progressive Creation, Gap, and Genesis Allegory (Appearance of Age) theories, which they believe contain "evolutionary" contents that "destroy the gospel of Jesus Christ." They also believe that evolutionism has seeped into the church, and Christian schools and colleges.

Some readers may be confused until they realize that the term "evolution" refers only to macroevolution, and does not include microevolution, i.e., changes within species. Ham and Taylor state, "There are now thousands of qualified scientists who are convinced that there is no scientific proof that the evolutionary process ever took place." I wonder if these "thousands of qualified scientists" know about some very real (micro)evolutionary changes in resistance to pesticides and antibiotics by harmful enemies of mankind? Microevolution should have been acknowledged; it seems too important to ignore.

This book has many oversimplifications and all-or-none statements that indicate a different concept of science than usual. For example, during a debate between Ham and a scientist who agreed that, " ... we will *never* know everything ... ," Ham asked, "That means you can't be sure about Evolution either, can you?" The scientist disagreed and stated, "Oh, no! Evolution is a fact!" Ham and Taylor conclude, "Once again, we see evidence that Evolution is a belief, not science." We do not know *everything* about the (micro)evolution of antibiotic resistance in bacteria but is this (micro)evolutionary process merely "a belief, not science?" Once again, a distinction between the facts of microevolution and the theories of macroevolution could greatly clarify communication.

The Genesis Solution is part of a film/video/book package produced by Films for Christ, a ministry that has produced three other films supporting young-earth creation. All of the 30 or so illustrations in its 14 chapters

came from the film, *The Genesis Solution*, and are well done with rather extensive legends. Although a few books are referred to in the text, there are no footnotes, end notes, or literature citations. Ham, an instructor in science education and Assistant Director of the Extension Services Division of the Institute for Creation Research, also wrote *Evolution: The Big Lie*. Taylor has also written *The Great Dinosaur Mystery and the Bible*, which supports another Films for Christ production.

The Genesis Solution is recommended as a very readable book for laypersons who want a Scientific Creationist interpretation of Genesis, but with a broader perspective than is usual for their publications.

Reviewed by L. Duane Thurman, Professor of Biology, Oral Roberts University, Tulsa, OK 74171.

EVOLUTION: The Great Debate by Vernon Blackmore and Andrew Page. Oxford: Lion Publishing, 1989. 192 pages, index.

The authors of *Evolution: the Great Debate* have written an objective, balanced account which avoids the extremes of young-earth creationism and atheistic evolutionism. In the Introduction the authors describe the book as follows:

> This book is not about the rights and wrongs of evolution or creation science. There is no detailed comparing of fossils, calculating of probabilities, or checking the validity of one theory against another. For there is a much more fascinating story to be told: the history of the idea of evolution itself and in its wake the troubled waters of religious argument. And here we will find not just religion, but the flotsam of political and social creeds, and the deep human craving for an understanding of our origins. Here, too, we will meet science. And we will encounter scientists. Hopefully we will learn to tell the difference.

The book was written in a popular style. Although it contains numerous quotations, it does not have footnotes or other extensive documentation. This may not be to the liking of some readers, but it does make the book much more interesting and enjoyable to read. It is a very attractive book with its more than 140 illustrations. Nearly any opening of the book has one, two, or at times, three illustrations. Many of these are old wood-cuts and lithographs, as well as numerous black and white and color photographs.

Both the style of writing and the general appearance of the book will make it more appealing to a general audience. That is not to say that the book would not appeal to someone trained in science. The authors have obviously done extensive research and a more popular style of writing does not detract from this.

The authors begin with early evolutionary ideas of the Greek philosophers and trace the development of the concept of evolution to the present day. Persons and ideas are treated by the authors in a fair and objective manner. The real intent of the authors seems to be to trace the history of the idea, rather than to defend or condemn a particular viewpoint.

The last chapter, "Melting Down the Gods" (the title is taken from a statement made by Julian Huxley, the prominent supporter of "evolutionary humanism"), provides an interesting summary-conclusion to the book. One of the authors (Blackmore) has researched the Huxley family, and much of this chapter deals with the evolutionary philosophies of Thomas Huxley and his grandson, Julian Huxley. Other proponents of evolutionism, such as Bertrand Russell, Richard Leakey, and Jacques Monod, are also discussed in this chapter.

The authors clearly reject evolutionism as a philosophy of life. They also reject the strict interpretations of creation science, as well as the so-called "God-of-the-gaps" mentality. Yet, they are committed to the concept of creation as evidenced by the following statement:

> ... God is behind, and within, and working through the natural phenomena, and a descriptive subject such as science will only ever be able to watch the interlocking network of his actions, and never discover the author himself.

The final paragraphs in the book summarize the attitude of the authors.

> Genesis then rings as true as ever, whether one follows an evolutionary account of biological origins or not. The phrases of this majestic first chapter still insist that God is Lord and that mankind is not under the sway of elemental forces, or without hope or meaning in life. We have no need of other gods or the manufacture of creation myths.
>
> We need not worship with Thomas Huxley at the altar of all-pervading natural law, or derive our security from the march of evolutionary history.
>
> We need not believe we are random collocations of atoms, or swallow the lie that life is a biological accident.
>
> We need not accept our lowly status as genetic survival machines, nor fear that one day we will be discarded in favor of more advanced models.
>
> Instead we can apply the poetry of Isaiah as we discard these worthless images. Our number did not just come up in the giant Monte Carlo game of life, but in the providential heart of God.

I found the book to be refreshing and would recommend it to anyone wanting an overview of the history of evolution written in an honest and objective manner.

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HUMAN FUTURE? LIVING AS CHRISTIANS IN A HIGH-TECH WORLD by Alan Jiggins. London: Scripture Union, 1988. 144 pages. Paper.

So many books have already been written concerning technological explosion, computer revolution and life in the new society with ubiquitous digital machines. Technology makes possible many things unheard-of in the past, but at the same time it makes people feel like cogs in mechanisms that very often seem to get out of hand. Thus what should we do in the face of its development? Is technology really a friend, or an enemy? Should we be afraid of it or look forward to what it brings?

These sort of questions are raised by Jiggins in his small but interesting book. "The author is not at all against technology as such, nor its development," states Oliver Barclay in the Foreword, because "our technological ability is a gift from God" (p. 17). However, he is against a rampant attitude toward technology, one that he calls technicism, toward seeing in it a panacea able to cure all ills of individual and social life. This position assigned to technology replaces faith in God (p. 9).

In our post-industrial society "nothing is sacred except the ideology of progress" (p. 19). People, on the one hand, constantly want to change everything to make progress possible. On the other hand, people are overwhelmed by all these changes. In part one the author lists many negative examples of the impact modern technological development has upon society, such as depersonalization in education and industry, the cult of the specialist, degeneration of hobbies, and the like.

Part two is an analysis of a technological society. It is, he says, "an arrogant and exploitative society. Aggressive and invasive power is corrupting our value system" (p. 58). It is aggressive since people forget that they are just stewards of this earth. The authority of God has been discarded and replaced by such idols as the power of technology or popular demand. It is also a machine-minded society, since machines became models for dealing with problems, restoring families, and saving societies. It is, finally, a double-glazed society, because people must live in the world of reality while being subjected to a secondary reality created by the world of commercials. What should a Christian do in such a world? This is a problem pondered in part three of the book.

First, we have to realize that the rejection of God is the source of all possible problems. "Our scientific attitude continues the process of alienation by suppressing our sense of transcendence" (p. 106-7). Science is very reluctant to admit the existence of what is unmeasurable and unobservable and so is the public. However, God should be acknowledged "at the centre as an eternal reference point" (p. 118).

Jiggins is very much opposed to the importance placed on institutional growth of the church that, sometimes, emphasizes the sacred-secular divide. However, the church in the sense of the body of believers should not sever all contacts with the world. There is a need to express a Christian point of view in many matters but also to understand the opinions of others. But "whatever we choose to do we must strive for excellence ... express a wider concern and bring more compassion than those with whom we contend. In those ways we can raise a Christian voice in a technological world, in the name of Christ" (p. 140-1).

Reviewed by Adam Drozdek, Professor of Computer Science, Duquesne University, Pittsburgh, PA 15282.

Books Briefly Noted

INSIDE AMERICA'S CHRISTIAN SCHOOLS by Paul F. Parsons. Macon, GA: Mercer University Press, 1987. 193 pages.

This book should be useful reading to all those involved in the movement as teachers, parents or financial supporters. The book ends with these words: "Do Christian schools have a more accurate image of the future? That is a decision each of us must make individually as parents and as citizens."

—David T. Barnard

INTELLECTUALS by Paul Johnson. New York, NY: Harper and Row, 1988. 385 pages, index. Hardcover; $22.50.

Intellectuals gives chapter-length snapshots of a number of individuals often regarded as intellectuals. Rather than just summarizing their lives and thought, this volume critically looks at the moral credentials and often deficient scholarship in these famous personalities. The level of analysis is excellent, particularly in the full chapter treatments of individuals, and Johnson is successful in making a case that the modern intellectual has to a great extent taken on the role vacated by the clergy. This role includes being the critic of humankind and morally evaluating trends.

—Donald Ratcliff

COUNSELING IN TIMES OF CRISIS by Judson J. Swihart and Gerald C. Richardson. Waco, TX: Word Books, 1987. 211 pages.

This book is divided into three main parts: The Foundation; The Framework; and The Techniques. Part one surveys the dynamics of a crisis, including the steps leading to a crisis. The framework includes illustrations of health-related, people-related, life-cycle, financial, and

spiritual crises. The third part on counseling techniques provides the specialized interventions for the crises that have been described, with a somewhat detailed review of the procedures.

This book can add a dimension to the library of the lay counselor and the professional counselor whose training has not covered these areas of concern—the reason for more detail than usual for this book. The authors provide practical procedures and examples. This treatment can start further research on each aspect that is discussed.

—Stanley E. Lindquist

WHAT EVERY CHRISTIAN SHOULD KNOW ABOUT THE SUPERNATURAL by McCandlish Phillips. Wheaton, IL: Victor Books, 1988. 255 pages. Softcover.

The premise of this book is that what you don't know about the supernatural *can* hurt you. Its purpose is to inform believers how they are related to God's invisible kingdom, how they can recognize and resist evil supernatural influences, and how they can help those who have fallen into evil entanglements.

The reader should be alerted to the fact that some of Phillips' examples can be interpreted in more parsimonious ways. For instance, he thinks that demonic obsession can be seen in phobias, extreme complexes, fetishes, fixations, besetting moods, and acute plaguing fears. Any book on maladaptive behavior provides a variety of alternate explanations.

—Richard Ruble

THINKING AND ACTING LIKE A CHRISTIAN by D. Bruce Lockerbie. Portland, OR: Multnomah Press, 1989. 172 pages. Softcover.

Lockerbie believes that God expects us to place high value on learning because everything there is to learn has come from God. He has little good to say about Christians who seem to base their religious life primarily on feelings and see little value in seriously studying the Bible. One of the difficulties in being an evangelical Christian is that the Christian sphere of influence is tiny compared to the Judeo-Christian sphere which is tiny compared to the secular. The result of this is the tendency for Christians to be not just in the world but of the world. The book, which is actually a collection of his lectures, deals with the need for evangelicals to understand this problem.

—Ralph Kennedy

RADICAL CHRISTIANITY: A Reading of Recovery by Christopher Rowland. New York: Orbis Books, 1988. 199 pages, index. Hardcover.

This book is about radical Christianity, a form of Christianity that strives for significant social change—that seeks to bring about social justice here and now. Beginning with the New Testament, Rowland quickly tiptoes through two millennia of church history, touching briefly upon a variety of Christian ascetics, Joachim of Fiore and the early Franciscans, those "subversives of the sixteenth century" known as the Anabaptists (especially Thomas Muenzer), England Diggers under Gerrard Winstanley, and then spending the last quarter of the book on the "theology of liberation." Few serious American Christians will find their armchair Christianity as comfortable after reading this book as they did before. It is a serious challenge for us to pay attention to the social demands of the Gospel.

—D.K. Pace

CAESAR'S COIN: Religion and Politics in America by Richard P. McBrien. New York: Macmillan Publishing Company, 1987. 286 pages. Hardcover; $19.95.

McBrien pays close attention to the legal and philosophical meanings of thirty-three key terms used in discussing the issues of the relationship between government and religion, free exercise of religious liberty, morality in the public square, abortion, and life in public and private schools. This book centers around Supreme Court cases involving those issues, and is enhanced by an appendix summarizing each of nearly one hundred Supreme Court First Amendment cases. Fifty-five pages of notes are also helpful.

—William H. Burnside

THE GATE OF HOPE by D. R. Morgan. Liberty, MO: Pinnacle Publishers, 1989. 227 pages. Softcover; $12.95.

Morgan writes about Jewish history from the Babylonian exile in 586 B.C. to the Roman destruction of the temple in A.D. 70. Events during this time served as a background for the rise of Rabbinic Judaism and New Testament Christianity. Much of the material in this book comes from recent research in Palestinian archaeology. Endnotes, a selected bibliography, and an index are included.

—Richard Ruble

THE CATHOLIC MOMENT: The Paradox of the Church in the Post Modern World by Richard John Neuhaus. San Francisco: Harper & Row, 1987. 292 pages. Hardcover.

Richard John Neuhaus is a leading Lutheran theologian and commentator on political and religious affairs. A long-time observer of and participant in interaction between Catholic and Protestant groups, Neuhaus has written a significant book. He introduces us to the major players in the current Roman Catholic Church: John Paul II, his main theological "trouble shooter," Joseph Cardinal Ratzinger, and here in the United States, Fr. Avery Dulles, the son of the late John Foster Dulles. The theological landscape following Vatican II is indeed a rich and complex one, and Neuhaus is a very insightful guide.

Some topics discussed in the book are: the place of paradox in the Church, Roman Catholic understanding of salvation, truths vs. values, and theology as anthropology. Liberation theology is also treated at length.

—Ralph MacKenzie

UNDERSTANDING CULTS AND NEW RELIGIONS by Irving Hexham and Karla Poewe. Grand Rapids, Michigan: Eerdmans, 1986. 166 pages, index. Paperback; $8.95.

The authors propose to outline the needs of individuals who classically join new religions, and then explain how new religions do or do not fulfill these needs. The book explains the value of Bible stories as myths, and contrasts them with the various myths that are prevalent within secular Western society today (astrology, E.S.P., and flying saucers, for example), arguing that the new religions use these social myths as a platform from which to lead people into their more elaborate belief systems. The ten chapters conclude with an attempt to distinguish Christianity from all other religions in a scholarly fashion.

—James G. Osborn

SURPRISED BY SUFFERING by R. C. Sproul. Wheaton, IL: Tyndale, 1989. 214 pages. Hardcover; $10.95.

According to the author, although Christians cannot be expected to like suffering and death, they should view them as a vocation to which all are called. Because the destiny of believers is in the hands of a loving God, they should not despair but trust. Sproul bolsters this message by appealing to the experiences of Job, Jesus, and Paul. Sproul's main point is that only the biblical teaching on suffering, life, death, and heaven can produce the insight and faith which will sustain believers and fill them with hope.

—Richard Ruble

COUNSELING CHRISTIAN WORKERS by Louis McBurney. Waco: Word Books, 1986. 292 pages, index. Hardcover.

McBurney deals with a subject of considerable importance, "Who counsels the counselor?" The book is divided into three parts, with several chapters in each section. Part I is on "Understanding the Hurting Christian Worker." This section is devoted to an analysis of the pressures and strains of the ministry, followed by a review of resistance to counseling. The second section covers the common diagnostic considerations and counseling approaches, application of the methods, and case histories concerning those in ministry. The last section involves therapeutic techniques; his unique contribution is the last chapter on "Spiritual Aspects of Counseling with Christian Workers," which is excellent. His appendix gives practical advice in dealing with potential sexual problems and internal and external danger signals that plague those in the ministry.

—Stanley E. Lindquist

Letters

A More Specific Reply to Thomas Key's Book of Mormon "Problems"

This letter is in response to an article titled "A Biologist Examines the Book of Mormon" by Thomas Key which appeared in the June 1985 edition of this journal.[1] The December 1985 issue included a short response by Ellis Davis,[2] a Mormon, and a brief rebuttal by Key.[3] Key listed, by my count, some 131 specific examples of what he called "a few of the numerous scientific problems in the Book of Mormon."[4] Davis' reply commented on some 24 of Key's "problems" in an anecdotal and vague manner, with no citations to the relevant secular or Mormon literature. Key was unimpressed, replying "as I see it, all of the [scientific problems] not discussed and practically all of the ones discussed still stand."[5]

For my own benefit, I prepared a list of Key's 131 so-called problems and began assessing his argument. The results were striking. Key's "problems" divide rather neatly, in my opinion, into four categories.

The first of these consists of some 42 instances where the Book of Mormon clearly does not say what Key alleged, making his "problem" non-existent. Included in this category is Key's first charge, that "1 Nephi 1:2 and Mosiah 1:4 assert that the native language of the Hebrews between 600 B.C. and 91 B.C. was Egyptian."[6] The Book of Mormon says no such thing: all it says is that the authors of the book knew how to write and read Egyptian and it is clear that Hebrew was the language of choice—"And if our plates had been sufficiently large we should have written in Hebrew ..." (Mormon 9:33).[7]

The second category consists of 17 instances where Key has made a double error—attributing to the book something it does not say, and then presenting a "problem" that examination of the evidence reveals not to be a problem anyway! An example of this is when Key alleged that the Book of Mormon tells of "the ample timber of Arabia"—it doesn't say that—and Key is blithely ignorant of the fact that there are areas of the Arabian peninsula with timber suitable for shipbuilding and used as such for millennia, such as Salalah in the Dhofar region of southernmost Oman, among others.[8]

The third category comprises another 38 instances where Key is at least partially or possibly wrong based on the evidence. For example, Key contends that there were no bees in the pre-Columbian Americas, when in fact there were several types of bees present, and honey was prized and an important article of trade.[9]

Into the fourth category fall some 33 instances where the issues are not "proven" at all, but are subject to debate and uncertainty as in the issue of whether silk was present in the pre-Columbian Americas.[10] While these unsettled issues do not confirm the book, neither do they disprove it, any more than the multitude of unsettled issues regarding the Bible prove or disprove it.

It is ironic that this journal, committed to defending the Bible as truth, chose to print Key's ill-informed attack on the Book of Mormon, inasmuch as his work is so akin in spirit to similar works attacking the Bible that have plagued Christians for years.[11] Despite his protestations of love for his Mormon friends,[12] Key's article shows all the signs of being merely a recitation of items culled from some anti-Mormon publication. I will gladly provide a copy of my fully documented and extensively footnoted study, which runs about 50 pages, to anyone interested enough to contact me.

In conclusion, I have carefully examined every single one of Key's 132 so-called "problems," and find none of them to be significant. In fact, I found that the exercise strongly confirmed my testimony of the Book of Mormon's truthfulness, based in part on previously unknown evidence that has come forth to support the book only after Joseph Smith produced it in 1830. I and many other informed Mormons, including hundreds of Christian ministers who have joined the Church of Jesus Christ of Latter-day Saints,[13] have come to the conclusion that the only plausible explanation for the Book of Mormon is that told by Joseph Smith. The Book of Mormon is a large and complex volume intended to present edifying spiritual and historical lessons for our day. Intriguing as its historical and cultural circumstances are, the Book of Mormon, like the Bible, is above all a religious testament, another witness to God's concern for his children, and a testimony of his intimate proximity to all who will accept the atonement of Jesus Christ our Savior.

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NOTES

[1]Key, Thomas D.S. "A Biologist Examines the Book of Mormon." *Journal of the American Scientific Affiliation* 37 (June 1985): 96-99.
[2]Davis, Ellis. "Reply to 'A Biologist Examines the Book of Mormon.' " *JASA* 37 (December 1985): 254-256.
[3]Key, Thomas D.S. "Dr. Key Replies." *JASA* 37 (December 1985): 256.
[4]Key, (June 1985): 97.
[5]Key, (December 1985).
[6]Key, (June 1985): 97.
[7]Ibid.
[8]Thomas, Bertram. *Arabia Felix*. New York: Scribner, 1932; pp. 48-49.
[9]Thompson, J. Eric. *Maya History and Religion*. Oklahoma City: University of Oklahoma Press, 1970 (1976), pp. 152-277. Also

see Bernal, Ignacio. *The Olmec World*. Berkeley: University of California Press, 1969, p. 20.

[10]Sorenson, John. *An Ancient American Setting for the Book Of Mormon*. Salt Lake City: Deseret Book, 1985. pp. 232.

[11]Haley, Rev. John W. *An Examination of the Alleged Discrepancies of the Bible*. 1988. See also Gleason L. Archer's *Encyclopedia of Bible Difficulties*. Grand Rapids, MI: Zondervan, 1982.

[12]Key, (June 1985): 96-97.

[13]Gibson, Stephen W. *From Clergy to Convert*. Salt Lake City: Bookcraft, 1983.

Dolphin Communication

Dorothy J. Howell makes a curious statement in her review of John D. Lilly's work (*Perspectives*, December 1988, p. 242): "Only successful communication with dolphins, if truly possible, can refute or confirm his claims." Would not successful communication necessarily confirm his claim of the intelligence of dolphins?

A strict refutation is more difficult, for all possible phenomena would have to be shown to be negative. However, a simpler empirical test can tell us how promising the attempt to communicate with dolphins may be. We know that dolphins have a very effective sonar. We can be confident that an intelligent creature, confronted with a simple target in the usual test situation, will not inquire into its health nor extend an invitation for an evening swim. So these signals, along with the sounds of a solitary animal navigating its tank, may be taken to involve no more than sonar signals. If these types of signals are subtracted from the signals detected from pairs or groups of dolphins, the remainder represents the social component, which may then be analyzed. Even here a portion of the signal may be the localization function relevant to a group situation. This last element would tend to exaggerate the communication potential. The only factors in the experiment that might underestimate the communication potential are the possibility that solitary cetacians obsessively talk to themselves or that our analysis is too crude to differentiate ranging from language in the vocalizations. The former can be reduced by discovering the difference between vocalizations when dolphins are in the same pool and when they are physically isolated with an auditory connection. The latter can be guarded against by considering all the possibilities of signal modulation, such as rate of repetition, which are not important in human languages.

We do not need to know anything about the structure of dolphin language, if there is one, to get a reasonably accurate estimate of the range of communication between dolphins. We can depend on the complexity and variation of the signal. The complexity of the signal is a measure of how much information can potentially be transmitted. Played against the variation, we have a better estimate of the actual transmission. For example, if someone yells, "Duck!" and you do, you may be saved an injury. The sound communicates. But simply repeating the cry any additional number of times does not add to the informational content, unless there is a new danger. However, if the person continues: "Kid. Throwing rocks. Behind the wall. To the right."—more information is given with each group of words. Were the utterances in a language unknown to us, we could still tell the difference between a repetition and a non-repetitive sequence. So comparing the qualities of the specified remainder of dolphin vocalizations against vocalizations by other species, such as the restricted range of the dog or the broader variety of the chimpanzee, can give us a reasonable estimate of the dolphins "vocabulary." Indeed, someone familiar with Shannon's work can probably quantify the communication potential. Such a comparison is not determinative, for other matters also enter in. For example, the complex variations of the mockingbird song probably convey no more information than the scream of a peacock or the repetitious crowing of a rooster, despite the greater potential in the variability.

Such an investigation should result in a dissertation and either a warning to waste no more time on dolphin "language" or a new opportunity for research with unpredictable potential. Either consequence would have value.

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Strange Inferences

Mr. Arthur Strahler's reaction to my article ["How Does the World View of the Scientist and the Clinician Influence Their Work?," Dec. 1989 *Perspectives*] provides a clear illustration of how one's world view influences not only what he perceives but how he interprets what he perceives.

Nowhere in my article do I even vaguely imply that clinicians with a secular world view lack "kindness and compassion" or are "cruel and inhumane and uncaring." All of that comes entirely from Mr. Strahler's mind—completely inferred by him.

If Mr. Strahler read more of my writings, he would know I have often stated that people who do not embrace the Christian world view may live the Christian ethic, and some even more effectively than one who does. And there exist good reasons for this—some of them being differences in the level of ethical training one has received early in life. For example, one who comes from a highly ethical and devout family may, as an adult, live the ethics but reject the religious philosophy from which those ethics originate; thus one's life may appear more ethical than one who has recently embraced the faith but comes from a secular family background.

As a psychiatrist I can't help but ask what really makes Mr. Strahler so emotionally "disturbed." If my lecture had been to a group of Boy Scouts and I wrote that adherence to the Scout oath to "help others at all times," etc., would and should influence Scouts to be kind and

compassionate to old ladies attempting to cross the street, would Mr. Strahler also charge that I am implying that all non-Scouts are cruel and inhumane and uncaring toward old ladies, that I am implying that Scouts are "unique in generating compassion and sympathy," that I am guilty of Scouting "chauvinism," and that I am implying that "all admirable qualities of character" are "egregiously limited to" Scouting?

I don't think Mr. Strahler would make such strange inferences, unless, of course, he had experienced some unfortunate traumatic early experiences with Scouting; experiences that perhaps resulted in unresolved inner conflicts that tended to influence and distort whatever he read about Scouting.

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A New Community

The autobiographical statement by Robert John Russell in the September 1990 issue of *Perspectives* was superb. His statement concerning his central beliefs about God is one of the best I have ever read. I wish to quote from the last sentence about his beliefs in God.

> I believe in a God whose spirit abides with us as counselor, comforter and teacher, who reveals the truth of all that we know and discover, who nourishes our soul with forgiveness, our minds with knowledge, our hearts with wisdom, our bodies with food, shelter and clothing, and who walks with us through the terror of death and dying into life everlasting.

Yet he admits that he struggles with the meaning of these core beliefs. He states that unless we are prepared to have our views falsified, we cannot claim that they grasp something deeply true about reality.

I know something of the terror of death, having lost my wife a little over a year ago and more recently having experienced the death of my brother-in-law.

The entire article by Russell states quite explicitly the over-all working of the ASA as we have struggled with problems relating science and faith over a period of 50 years.

Russell says that we are moving toward a new community. He further states that science has brought both greater knowledge and more staggering moral and spiritual challenges to our age than any other system of thought in human history. Could it be true that we are only just now beginning a long road ahead? Russell feels that to be the case.

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A Minor Disagreement

I have one minor disagreement with the fine paper, "Presuppositions of Science," by Dr. Gordon C. Mills [Sept. 1990 *Perspectives*]. I am unsure if this point has any effect on his message, but it may.

Dr. Mills' thesis rides heavily upon his challenge to the following basic presupposition: "That everything (including origins) can be explained in terms of natural processes." I realize that this is a quotation; I think the original author, and many other people, would be equally comfortable with the following minor variation:

"That everything (including origins) can be *potentially* explained in terms of natural processes."

This variation allows for the fact that we don't know everything, and never expect to know everything. The difference may be subtle, but it is real.

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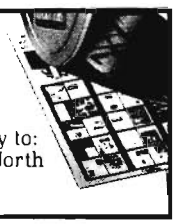

The American Scientific Affiliation

Founded in 1941 out of a concern for the relationship between science and Christian faith, the American Scientific Affiliation is an association of men and women who have made a personal commitment of themselves and their lives to Jesus Christ as Lord and Savior, and who have made a personal commitment of themselves and their lives to a scientific description of the world. The purpose of the Affiliation is to explore any and every area relating Christian faith and science. *Perspectives* is one of the means by which the results of such exploration are made known for the benefit and criticism of the Christian community and of the scientific community.

Canadian Scientific & Christian Affiliation

A closely affiliated organization, the Canadian Scientific and Christian Affiliation, was formed in 1973 with a distinctively Canadian orientation. The CSCA and the ASA share publications (*Perspectives on Science & Christian Faith* and the *ASA/CSCA Newsletter*). The CSCA subscribes to the same statement of faith as the ASA, and has the same general structure; however, it has its own governing body with a separate annual meeting in Canada.

LOCAL SECTIONS

of the ASA and the CSCA have been organized to hold meetings and provide an interchange of ideas at the regional level. Membership application forms, publications, and other information may be obtained by writing to: American Scientific Affiliation, P.O. Box 668, Ipswich, MA 01938, USA or Canadian Scientific & Christian Affiliation, P.O. Box 386, Fergus, ONT N1M 3E2, CANADA.

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INDICES to back issues of *Perspectives* are published as follows:

Vol. 1-15	(1949-1963),	Journal ASA	15,	126-132	(1963);
Vol. 16-19	(1964-1967),	Journal ASA	19,	126-128	(1967);
Vol. 20-22	(1968-1970),	Journal ASA	22,	157-160	(1970);
Vol. 23-25	(1971-1973),	Journal ASA	25,	173-176	(1973);
Vol. 26-28	(1974-1976),	Journal ASA	28,	189-192	(1976);
Vol. 29-32	(1977-1980),	Journal ASA	32,	250-255	(1980);
Vol. 33-35	(1981-1983),	Journal ASA	35,	252-255	(1983);
Vol. 36-38	(1984-1986),	Journal ASA	38,	284-288	(1986);
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