

Articles

CHALLENGING DESIGN: HOW BEST TO ACCOUNT FOR THE WORLD AS IT REALLY IS

by *Leif Edward Ottesen Kennair*

Abstract. Evolutionary psychology and intelligent-design theory both need to be able to account for the empirical world, or the world as it is. This essay is an attempt to clarify the challenges these theories need to meet, if the relevant empirical findings are replicable. There is evidence of change in the biological world and of modularity of mind, and there is a growing body of work that finds evolutionary theory a convincing and fruitful account of the “design” of the mind. Three major empirical findings within evolutionary psychology are presented and discussed. The author claims that Cartesian dualism, as it is usually meant within psychology—a split between body and mind—is false, but that Descartes’ original division between body and soul has not been challenged and is not challenged by the evidence that the mind is also a biological entity. The article concludes that the convergence of theology and science is to be found in the onus to discover the truth about the world as it really is, and this calls for an ability on both parts to account for the empirical world.

Keywords: cheater detection; dualism; evolutionary psychology; evolutionary theory; homicide; human nature; intelligent-design theory; mate selection; stepchildren.

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EVOLUTIONARY PSYCHOLOGY, CHRISTIANITY, AND
THE SCIENTIFIC STUDY OF HUMAN NATURE

Evolutionary psychology (EP) is often described as a merger between functional cognitive neuroscience and adaptationist evolutionary theory (e.g., Dennett 1995; see also Kennair 2002a). Quite a few scientists from different fields, including biologists and staunch anti-creationists, claim that evolutionary theory cannot inform scientific inquiry into the workings of the mind (see Davies 1996; Gould 1991; Lewontin 1990; Richardson 1996). Many Christian scientists claim that evolutionary theory by itself cannot explain the most crucial phenomena involved in explaining the origin of life (e.g., Behe 1996). Given this, there might be reason to question the foundation of EP; if there is no reason to add the biological theory of evolution to the study of mind, it will not promote new discoveries or aid the systematization of data. An alternative critique could be radical social constructionism and postmodern relativism, which are not going to be addressed further here—as both EP and Christianity take the perspective that one may address the world as it really is—within the limits of their respective methods: science and personal religious experience. This is one reason why science critique à la Phillip E. Johnson¹ seems to run contrary to mainstream Christian belief, being a radical form of agnosticism: we cannot even know the creation.

This essay presents a theoretical discussion of EP and intelligent-design theory (IDT), focusing on what criteria either theory must meet to be scientific as well as looking at what questions are not resolved by scientific method. In the process I elaborate on a challenge offered in a recent call for papers for a special edition of a journal focusing on IDT and EP, an edition that did not accept any pro-EP contributions. The challenge was: In what way may IDT “better account for recent findings [of EP]” than evolutionary theory?

I am not Christian, and I am convinced that evolutionary biology is the most likely and best-developed scientific explanation of the history, diversity, and adaptation of life. I call myself an evolutionary psychologist. The arguments in this essay are meant to be respectful and balanced theoretical inquiries into the many and important questions that arise in the breaking point between different Christian perspectives and EP. This disclosure is offered so that the reader may be critical of the text while not having to speculate about the author’s stance.

MODELS OF MIND

Evolutionary psychologists are developing a comprehensive model of the mind. This has been lacking within psychology. Apart from Sigmund Freud’s psychoanalytic metatheory, and consequent renderings of this theory by other psychoanalytically oriented theoreticians, there has been no at-

tempt at formulating such a model of mind. Empirical psychological science has to a large extent avoided the development of theory, and theoretical psychology has often dismissed empirical science as irrelevant. Thus, one side has been a blend of dust-bowl empiricism and ad hoc theorizing, and the other has lacked the scientific basis needed to develop the psychotherapeutic technology it promised.

As psychoanalysis has grown and then withered within clinical psychology and psychiatry, the same has happened to behaviorism within American academic psychology. Behaviorism never became as influential in, say, European psychology. No other uniting model has been able to replace these two grand theories as they failed to deliver on their promises to explain most aspects of psychology—the result being a general unease with large theories, as one can see in modern biological psychiatry. Another result is fragmentation within academic psychology, as no theory—apart from the acceptance of the reality of cognition (Sperry 1993)—has been able to collect all the subdisciplines of psychology within one framework. Methods and mini-theories vary from discipline to discipline and within fields of research. EP combines both empirical science and theory development in its work on describing the mind and is the closest thing to an integrative theory for psychology (Buss 1995; Buss in press; Kennair 2002a). David Buss even offers an alternative to the manner in which psychology as a subject has been divided into arbitrary subdisciplines: one cannot study development without studying neurobiology, cognition, and social psychology or behavioral genetics, and the same goes for any other subdiscipline. Buss suggests that psychology be studied by approaching the mind as formed by the adaptive problems that our species has met throughout evolutionary history (Buss in press).

The EP model of mind is modular when it comes to not only perceptual process but also higher cognition. Different mind mechanisms are expected to solve different cognitive problems. Some of these mechanisms are informationally encapsulated, and most process information without us being conscious of how, but they are all at the functional level computational mechanisms (Pinker 1997). To be able to perform relevant and adequate computations based on ecological or contextual information, these mechanisms need to have predefined rules (algorithms) and constants. Thus the tabula rasa (blank slate) model of mind is theoretically impossible (see Pinker 2002 for an exposition); to be able to perceive through, e.g., inverse optics, one needs rules for stable optical phenomena as well as ecological constants involved in the processing of relevant optical information that is hard-wired genetically into the mind. A mind or brain that is not built in accordance with stable and biochemically predictable procedures will be a neural chaos incapable of function. Rules of development must also be genetic, for the same reason. The most accepted biological theory to explain how information is stored in the genes is evolutionary theory. This is

therefore the theory of choice when one wishes to explain why certain modules exist or predict the existence of these mental mechanisms (Cosmides and Tooby 1994).

There is a competing theory: creation by intelligent design. If the mind is designed, and the data from empirical studies prove true—that the mind is modular—the existence of these modules poses a challenge. The theory of creation by intelligent design must also develop a model of mind and explain and describe its design. This theory has often been discarded as nonscientific because of its close ties with religious persuasion rather than empirical work. The major challenge for design theory is to become a predictive theory of what design one may expect to find, rather than concluding post hoc that there is intelligent design in any complex phenomena. If Robert Pennock (1999) is right that William Dembski's (1998) design inference filter does not work, as neither law and chance nor law and design are mutually exclusive, intelligent-design theorists have to develop new approaches to predicting intelligent design and qualities of this design prior to empirical investigation. Also, if evolutionary theory is able to predict what design one expects to find, IDT also must be able to achieve this in order to stay in the competition. Actually, even if design theory proved to be true, its scientific value would be minimal unless it could predict and explain the world as it really is (the empirical world).

TYPES OF EVOLUTIONARY PSYCHOLOGY

There are three major types of evolutionary psychology (Kennair 2002d; 2003): mainstream, general, and popularized.

Mainstream EP. This is a theoretically stringent and empirically rigorous approach. Building on groundbreaking empirical and theoretical work, psychologist Leda Cosmides and anthropologist John Tooby have developed a model that has proven to be integrative and a fruitful hypothesis generator. Theoreticians and empirical scientists crucial to the development of this theory include Margo Wilson, Martin Daly, and Donald Symons. Buss and Steven Pinker are prominent researchers within and advocates for this specific approach to evolutionary studies of human nature. The model of mind that defines this group includes a major focus on human nature rather than comparative studies. The evolutionary theory is closer to Richard Dawkins's than to, e.g., E. O. Wilson's. The major recent introductory texts to evolutionary psychology present this approach (Buss in press; Gaulin and McBurney 2001).

General Evolutionary Approaches. Some would claim that sociobiology turned into EP (Dennett 1995, for example). I disagree (see Kennair 2002a). Most sociobiologists have continued to be sociobiologists, making their personal changes to methods, perspectives, and areas of research.

Also, there are those who have performed evolutionary-informed studies for many years but have resisted being called either sociobiologists or evolutionary psychologists. Most evolution-oriented writers fall into this camp. Thus, major names within evolutionary studies of the human mind are best described as part of a nonuniform and nonspecific approach. The group includes Laura Betzig, John Cartwright, Peggy La Cerra, Charles Crawford, Dan Dennett, Robin Dunbar, Paul Gilbert, Herbert Gintis, Sarah Blaffer Hrdy, Bobbi Low, Roger Masters, Geoffrey Miller, Randolph Nesse, D. S. Wilson, E. O. Wilson, and others. Note that I am assigning researchers to this group based on my own evaluation of their writings; they themselves may wish to be included within mainstream EP. There may be a limited belief in modularity, a wish for other theoretical and methodological approaches, or a focus on current reproduction success or animal models. A problem with this approach is that the great theoretical diversity hampers theoretical synthesis (Kennair 2002d). Thus it is possible for Cartwright (2001) to write an introduction to evolutionary explanations of human behavior without agreeing theoretically with mainstream EP or referring to any large degree to Cosmides, Tooby, Pinker, or Buss or even interpreting the findings of major mainstream evolutionary psychologists as they themselves do (see Kennair 2002d).

Popularized Evolutionary Psychology. Authors in this group do not first and foremost publish within academic traditions but let their narratives be informed by different aspects of the two approaches above. The major problem this causes is that many critics of EP (even academic ones) are more familiar with popular science than with empirical studies or theoretical expositions in academic journals. Although Steven Pinker's *How the Mind Works* (1997) is a popular work, one may claim that it is a reasonable presentation of mainstream EP. Also, Dennett's *Darwin's Dangerous Idea* (1995) is probably more typical of general evolutionary approaches to human nature than a popular text. Two works that spring to mind as examples of popularized evolutionary psychology are Matt Ridley's *The Red Queen* (1994) and Robert Wright's *The Moral Animal* (1994).

It is important to note that the opposing approaches all may find themselves at home within the Human Behavior and Evolution Society and publish in or serve as consulting editors for the society's official journal *Evolution and Human Behavior*. Further, it is important to know what approach someone is criticizing or advocating. Attacking popular science as if it were bona fide academic work or science is off the mark. Claiming that all proponents of evolutionary approaches to the study of human nature are similar is equally wrong.

I personally find attractive rigor and stringency and the possibility of combining the research of several scientists within a theoretical framework especially designed to be integrative and informed of modern cognitive

neuroscience as well as evolutionary theory. I therefore identify myself as a mainstream evolutionary psychologist, and for the purposes of this essay I define evolutionary psychology as mainstream EP.

DUALISM

Within both the science and the practice of psychiatry and psychology there has been a struggle with theoretical positions defined by a dualistic *Weltanschauung*. This has given rise to different practices and understandings in both directions: mindlessness and brainlessness (Eisenberg 1986; 2000). Today more fruitful *biopsychosocial* approaches are advocated (Gilbert 1995; Kennair, Aarre, Kennair, and Bugge 2002).

Descartes' dualism was proposed to protect the holy soul from becoming the subject of natural science, staying safe within the limits of theology. This has in further developments of dualism included most mental processes; thus, psychoanalysis veered from a (natural) scientific investigation of the mind, and behaviorism deemed mental processes impossible to study scientifically. The cognitive revolution within academic psychology and the development of biochemical interventions within psychiatry have falsified the validity of this form of dualism (Gazzaniga 1995; 2000; Kandel 1998; Kennair 2003; Sperry 1993).

Psychological versus biological dualism is today a position impossible to defend (Kennair, Aarre, Kennair, and Bugge 2002; Pinker 2002). We now have psychoactive drugs for many different mental states. Further results show that cognitive behavior therapy may cause changes in the brain similar to pharmacological interventions for obsessive-compulsive disorder. We also know that learning and social context change brain function and structure (Kandel 1998). But it is important to note that the "Cartesian" false dualism of psychology versus biology does not make Descartes' dualism of body and soul false. EP does not address matters of the soul, and neither do other mainstream biopsychological scientific research programmes.

EVOLUTION AS AN ONGOING PROCESS OF CREATION

The Roman Catholic perspective on evolution has changed recently with the Pope accepting evolution for the body (but not for the soul). The Anglican Church also is quite positive toward evolutionary theory. Obviously this is not the position of all Christians, but it does mean that "Christian" does not mean "opposed to evolution." There is no reason to pit evolution against creation unless one demands that the creation described in Genesis or elsewhere is to be taken literalistically. If this is one's position, the logic or evidence of any other position does not matter, because one already has one's answer. Such a position will be limiting to any further discourse or analysis of the current problems. If one's view is not open

to challenge, one will never be able to discover whether it is true or not.

Take the example of technology and science. If one learns something true about the workings of the world, and it is stable enough, one may utilize it in the form of practice—that is, take the step from science to technology. If it works it is true. If it is stable, it may be described according to rules, even if there have to be contingencies to make them come about; much, if not most, science is statistical.

Bacteria's development of resistance to antibiotics is predicted by evolutionary theory. If the stable and most relevant selection factor for bacteria is antibiotics, selection will favor those that are resistant, and their genes will spread through the population, increasing the number of bacteria that are not affected by antibiotics. If this evolutionary insight is not heeded by those who administer antibiotics, resistant bacteria may become a hazard.

All changes in species and subspecies are evidence of ongoing change to the biological world. New diseases arise, and others are wiped out. Species become extinct. The beaks of birds change. Bacteria develop resistance to antibiotics. The world is in flux. From a theological point of view, if God creates the world, and the world is changing, then creation is an ongoing process. Why should not creation be a continuous process? Change is a characteristic of the world from both the biblical/theological and scientific points of view: the way things were they no longer are, and the way things are they have not always been. There are reasons within both perspectives to believe that this also holds for the future.

This does not mean that evolutionary theory is the only explanation. One needs to critically address the evidence for and against any theory. Apart from the dualism and the question of when human beings became creatures with souls, however, there does not seem to be any reason for conflict between the theory of evolution as it is and the idea that evolution is the process God instigated in order to create the world as it is and as it will become—or evolve to be.

INTELLIGENT DESIGN AND THE FINDINGS OF EVOLUTIONARY PSYCHOLOGY

What is the difference between modern evolutionary theory and the theory of intelligent design? Many authors have attempted to answer this question. One simple answer may be that one is the process and the other is a belief about what caused the process to start. A more dichotomizing approach would be to claim that nothing has evolved versus evolutionary theory is only “adaptationism.” Few theologians who are interested in the beaks of finches on the Galapagos or able to study the genetics of bacteria that have been exposed to antibiotics would find reason to claim that nothing biological changes at the genetic level. Consequently, these theologians would probably find that there are phenomena that need explaining.

Similarly, no major evolutionary theorist will claim that all biological products of evolution are adaptations; if this position ever was more than a straw man, constructive criticism of it has removed it from modern approaches (Kennair 2002a).

An IDT must be able to address the question of change of design over time. Does the intelligent designer alter the design in a hands-on process? (As stated earlier, the easiest solution would be that the Creator uses evolution to accomplish this, but it is not likely that this stance is possible within all of Christian theology). It also must be able to address those faults and makeshift solutions to many problems that are either not adaptations or are less than optimal adaptive solutions; evolutionary theory does not predict perfection but rather practical melioric design (that is, solutions that work better at the time than the last solution did) (Dawkins 1982). Last, but not least, it must be able to better account for recent findings of EP than evolutionary theory.

This is a crucial question. To illustrate the challenge, we cite a few findings from the broad field of evolutionary psychology.

1. *Social reasoning is effective, rational, modular, and context specific.* Cosmides (1989) has found that for certain rational problems, such as those presented by the Wason Selection Task (Wason 1966; 1983), there is evidence that human cognition is efficient and rational but also context-specific and modular. The Wason Selection Task is a logical exercise that usually is hard to solve, although it follows a Popperian logic of investigation through falsification. By making a certain number of investigations the subjects (Ss) are asked to test a rule. The correct response is to test whether the rule is being broken (falsification), but usually Ss attempt to confirm the rule, which does not provide conclusive information. When the rule is framed as a social-cheater detection situation the task is solved correctly to a much greater degree than when it is merely a formal logical task with no specified ecological or social context. This happens even if the specific situation is unfamiliar to Ss—as long as one keeps the cheater detection solution stable.

Consider this example. Four cards are displayed on a table. On one side of each card is a letter, on the other side a number. Two cards are showing letters, and two are showing numbers. The cards represent different ratings of people and their corresponding document code. The rule is: If a person has a *D* rating, then his document must be marked code 3. The cards show *D*, *F*, 3, 7. Which two cards must you turn to test whether the rule is true for these four cards? Most people find this difficult. What are your suggestions? The answer is described in Figure 1, but do not peek before attempting to answer the question.

Consider a second example. Your job is to make sure that those drinking alcoholic beverages in a bar are 20 years old or older. The four cards

still represent four different people. Now they indicate on one side what a person is drinking, either beer or cola. The other side indicates age, in order to check whether they are over or under 20. In this case the cards show “drinking beer,” “drinking coke,” “25 years old,” and “16 years old.” The rule is: If a person is drinking beer, that person must be over 20 years old. This is a social-cheater detection context. Which two cards would you turn now to check that the rule is being followed? Most people find this much simpler. Read on when you have decided which cards to turn.

If you, in the Abstract Problem (AP), turned the cards indicating *D* (in order to see whether there was a 3 behind it) and the 3 (in order to check for a *D* behind it) you had a typical confirmation bias response. If your solution was to turn the *D* (in order to not find a 3 behind it) and the 7 (in order to find a *D* behind it, thus falsifying the rule) your answer was correct. Note in Figure 1 how the rule may be expressed in formal logic as: If *P* then *Q*. The answer is: *P* and *not-Q*. The Drinking Age Problem (DAP) has the same logical structure. But in DAP very few people turn the card indicating “25 years old” in order to see that the person actually is drinking beer—because it does not matter: this person is not breaking the social rule. Most check the age of the beer drinker and the drink of the 16-year-

Figure 1. Content effects on the Wason selection task. The logical structures of these two Wason selection tasks are identical; they differ only in propositional content. Regardless of content, the logical solution to both problems is the same: *P* & *not-Q*. Although only 4–25% of college students choose both these cards for the abstract problem (a), 75% do for the drinking-age problem (b)—a familiar “standard social contract”.

<p>a. Abstract Problem (AP)</p> <p>Part of your new clerical job at the local high school is to make sure that student documents have been processed correctly. Your job is to make sure the documents conform to the following alphanumeric rule:</p> <p style="text-align: center;">“If a person has a ‘D’ rating, then his documents must be marked code ‘3.’” (If P then Q)[*]</p> <p>You suspect the secretary you replaced did not categorize the students’ documents correctly. The cards below have information about the documents of four people who are enrolled at this high school. Each card represents one person. One side of a card tells a person’s letter rating and the other side of the card tells that person’s number code.</p> <p>Indicate only those card(s) you definitely need to turn over to see if the documents of any of these people violate this rule.</p> <div style="display: flex; justify-content: space-around; text-align: center; margin-top: 10px;"> <div style="border: 1px dashed gray; padding: 5px; width: 60px; height: 60px; display: flex; align-items: center; justify-content: center;">D (P)</div> <div style="border: 1px dashed gray; padding: 5px; width: 60px; height: 60px; display: flex; align-items: center; justify-content: center;">F (not-P)</div> <div style="border: 1px dashed gray; padding: 5px; width: 60px; height: 60px; display: flex; align-items: center; justify-content: center;">3 (Q)</div> <div style="border: 1px dashed gray; padding: 5px; width: 60px; height: 60px; display: flex; align-items: center; justify-content: center;">7 (not-Q)</div> </div>
<p>b. Drinking Age Problem (DAP; adapted from Griggs & Cox, 1982)</p> <p>In its crackdown against drunk drivers, Massachusetts law enforcement officials are revoking liquor licenses left and right. You are a bouncer in a Boston bar, and you’ll lose your job unless you enforce the following law:</p> <p style="text-align: center;">“If a person is drinking beer, then he must be over 20 years old.” (If P then Q)[*]</p> <p>The cards below have information about four people sitting at a table in your bar. Each card represents one person. One side of a card tells what a person is drinking and the other side of the card tells that person’s age.</p> <p>Indicate only those card(s) you definitely need to turn over to see if any of these people are breaking this law.</p> <div style="display: flex; justify-content: space-around; text-align: center; margin-top: 10px;"> <div style="border: 1px dashed gray; padding: 5px; width: 60px; height: 60px; display: flex; align-items: center; justify-content: center;">drinking beer (P)</div> <div style="border: 1px dashed gray; padding: 5px; width: 60px; height: 60px; display: flex; align-items: center; justify-content: center;">drinking coke (not-P)</div> <div style="border: 1px dashed gray; padding: 5px; width: 60px; height: 60px; display: flex; align-items: center; justify-content: center;">25 years old (Q)</div> <div style="border: 1px dashed gray; padding: 5px; width: 60px; height: 60px; display: flex; align-items: center; justify-content: center;">16 years old (not-Q)</div> </div>

^{*}The logical categories (*P*s and *Q*s) marked on the rules and cards are here only for the reader’s benefit; they never appear on problems given to subjects.

Fig. 1. Illustrating the logic of the Abstract Problem (AP) and the Drinking Age Problem (DAP). Reprinted from Cosmides 1989, 192. Copyright ©1989. Reprinted with permission from Elsevier Science.

old (turning the cards “drinking beer” and “16 years old”—yet again, *P* and *not-Q*). Did you get this one correct?

Chances are you did not manage the first test, AP, but managed the second one, DAP. The logic is exactly the same, and the process for solving them, too: falsification. Because of the lack of context in the first test, however, you probably used a more general than context-specific human response to rules and let your confirmation bias confuse you.

The full set of tests of Cosmides’ (1989) hypothesis ought to be read in the original, as this is probably the most influential paper within EP. Pinker (1997) also provides an illustrative example of this research.

An evolutionary account: With our limited resources and a dependence on social interaction, anyone who could cheat undetected in social situations would have a large benefit, and those unable to detect that they were being cheated would run the risk of being cheated. Likewise, those able to detect a cheater would minimize their chance of being cheated out of resources. It makes sense in a world populated by potential cheaters that one ought to be able to swiftly and naturally detect cheaters. If a logical task uses modules adapted to such problems, the logical task will be solved simply, while the same formal logic might pose a more difficult problem when framed outside the context for which the organism is predisposed for detecting the breaking of rules.

2. *Stepchildren are forty times more likely to be the victims of violence and seventy times more likely to be the victims of murder than biological children.* Martin Daly and Margo Wilson (1988) found in their studies on stepchildren and homicide that stepchildren under five years of age are almost forty times more likely to be the victims of violence than biological children are at the same age. When they investigated the more serious assaults that ended in infanticide, the numbers increased to suggest that stepchildren two years of age or younger are almost seventy times more likely to be victims of homicide than biological children are at the same age.

An evolutionary account: Children cost resources. Spending already limited resources on genes other than those that are likely to be one’s own reduces one’s own genes’ chance of replication. The rational, although not moral, solution is for parents to get rid of the extra burden and give full attention to their own children. This is not what happens. Humans do not have adaptations for killing stepchildren such as langurs and lions do. Most stepchildren survive, and raising stepchildren is a common practice in almost all human cultures. As the numbers are so obvious in this case, however, there is reason to believe that the human mind has some “design” that evaluates kinship and that increases the chance that one does *not restrict violence* toward the child who is an extra burden and is not genetically one’s own. (See Cartwright 2001 for a typical misunderstanding of Daly and Wilson’s account, and see Kennair 2002b; 2002c for critiques of such misreadings. The Daly and Wilson text [1988] is explicit that there is no

mental module that causes stepparents to kill their stepchildren, but for further reading see Daly and Wilson 1998; 2001).

3. *There are cross-cultural gender differences in rating good financial prospects as important in mate selection.* David Buss and his colleagues (1990) conducted a study in 37 different cultures in which men and women rated the importance of different qualities of hypothetical mates. The study sampled 10,047 individuals from all continents, from different political and religious systems, and with different marriage/mating practices. They found that women consistently, across all included cultures, rated good financial prospects as more important when selecting a partner than men did, on average twice as much.

An evolutionary account: Because of the burden our ancestors had in acquiring resources, there is reason to believe that when choosing a mate to have children with, men chose women who could make a good biological contribution (good health, youth, etc.), while women chose men who could provide resources and/or status to them and their children.

Concluding remarks about the three studies. The findings of these studies are explained and predicted by evolutionary theory. It is less obvious how IDT would account for these phenomena. Obviously, I have selected prominent theorists and scientists, and findings that lend themselves readily to evolutionary explanations, but these are to a large degree the foundations of the evolutionary approach. Many findings within modular cognitive neuroscience do not call as clearly for an evolutionary design theory. At the same time, many criticisms of EP do not represent major findings and theorists but focus rather on popularized versions such as Robert Wright's (1994) and Ridley's (1994) books. In any case the question stands: What theory is the better *scientific* account of these findings?

The first step toward challenging the relevance of these findings is to attempt to replicate them. If this cannot be done, the results do not constitute a challenge. If these results are stable, there must be a design that causes them. It is important to note that it is not good strategy for intelligent-design theorists to withdraw to the cultural-influence argument every time they discover stable mind processing that does not fit their theory. If the mind was designed, it was given a set of possible states. The question will always ultimately be, How and why may culture be evoked in such a manner given the (evolutionary/contingent/intelligent/intentional) design of the mind? A design theory must shed light on how the design makes this possible or necessary, and why—What was (is) the function?

INTELLIGENT-DESIGN THEORY AND SCIENCE

The most important issue at stake for supporters of IDT within the context of empirically and theoretically accounting for scientific findings is

that the theory has to first and foremost be a scientific theory—and committed to this approach to reality.

The work of William Dembski (1998) is an attempt to show how a phenomenon is the result of either laws of nature, chance, or intelligent design. This has been challenged by Pennock (1999) and Branden Fitelson, Christopher Stephens, and Elliot Sober (1999). Dembski does not first and foremost explicitly argue against evolution, although the implicit meaning seems clear given the greater context of Dembski's work. If one has a process that may be described as an interaction of chance, natural law, and design, his taxonomy is at fault from the start, and dividing the world into such false compartments will give odd results, as the divisions are arbitrary. I believe that evolution may be such a process. Behe (1996) suggests that evolution is not possible before life is created, that is, before a certain level of complexity is present, and if he had evidence of this it would be an important discovery. The criticism he has received from evolutionists concerning the fact that he has not published these findings in peer-reviewed journals is significant. Such important scientific findings ought to be peer reviewed, and lack thereof may mean that they do not pass methodological or theoretical muster. Pennock's analysis of "the new creationists" (1999) is rarely mentioned by his opponents, other than to be discarded as irrelevant. The important message both Pennock (1999) and Douglas Futuyma (1983) send is that creationism (including IDT) is not science, and as such cannot be taught as science, and will be treated by, e.g., the government as religion. If it were science, it would have to adhere to the rules of science. Thus, every challenge provides IDT with the chance to prove its merit as a scientific theory. How well it performs as a scientific theory will probably be important in future political and scientific debates.

Within the history of science and the world in general there has been no lack of theorists who go searching for what they believe to be the truth about the world. This is not a problem as long as one has to present replicable, falsifiable, empirical evidence to back one's claims. Interpretations of the results may vary, and competition between these interpretations fuel further attempts at empirical discovery. If IDT is a scientific theory, it will have to attempt to gather empirical results that are predicted by theory, and the counterinterpretations of evolutionary findings must be able to communicate to the rest of the scientific community.

DISCUSSION AND CONCLUSIONS

Culturally predetermined ideas about the world and its workings are ideas that need to be tested; the result of the investigation will tell whether the ideas were correct or not. It would be hard today to accept that the world is flat, although during most of recorded history this is the shape it was thought to have by humans, both Christians and non-Christians. From a theological point of view, one might say that any shape humans imagine

that the world has is irrelevant when the question is: What shape has God given the world? An omnipotent God, who may give the world any natural laws God wishes it to have, may also pick laws that do not seem intuitive to human beings. Surely the whole idea of preaching the Truth in the form of prophecies and gospels is to inform humans of what we do not intuitively know. From a Christian perspective, science is the study of how the world really is—how God actually created the world, rather than how we perceive it to be. How the world really is ought to be the point of all rigorous academic study, from theology and history to psychology to biology and physics.

Theologically, the task at hand is to assess the available information and understand how convergence between science and faith may be possible. I take for granted that those academic theologians and Christian psychologists who are interested in science and research have an open but critical approach to both faith and science. A fundamentalist approach preordains all answers, and no discourse is possible; the individual's own ability to solve the mysteries of the world through faith is all that is relevant. Any modern Christian theology must be able to assimilate truths about the world as it is, including findings from cognitive neuroscience and the biology of the mind as well as whether the world is spherical or flat.

Similarly, psychological science has to critically assess its findings and the theories implemented to explain the data. If there is evidence that falsifies the theory, or the findings cannot be replicated, or the theory continuously fails to predict the world as it is, the scientist must search for a new theory. If EP is nothing but psychology with a redundant and incorrect theory guiding it, EP itself will evolve into a new form of psychology (intelligent-design psychology or cultural-relativist psychology?) or become extinct. It is not important what motives critics of EP have to test the limits and validity of the theory but rather what evidence of falsification or more fruitful competing theories they can offer. These are the rules of the game of science—and even if I am convinced that EP is currently one of the most promising and scientifically rigorous approaches to the study of the mind, I will have to find other approaches if this one proves to be incorrect.

Intelligent-design theory applied to the design of mind must be a predictive theory—it must expect there to be certain modules or mechanisms of mind that are more able than others to reduce the hypothetical design space (which, without theory to limit it, is infinite). It must also be falsifiable, at least at the level of predictions; the global metatheory of Darwinism is probably not logically challenged by specific evolutionary predictions, and neither would IDT be falsified by such cases. One still needs to build a body of knowledge that is systematically explained and predicted by the metatheory, or it cannot achieve relevance within science. Finally, to be able to replace other theories (in this case design theories of mind, theories

of why the mind is constructed the way it is) it must offer better predictions and explanations of a growing body of data within empirical psychology than existing theories can. This combining of theory and data is a major challenge within psychology today.

This is the area of convergence: the world as it is from either point of view has to be explained within both systems of understanding. The task of both epistemologies is to find ways to explain the truth about the world as it is. This has been the motivating force for most scientists from the time of Newton to the present. Thereafter, the soul may still be the domain of religion, as the dualism of soul and mind is still a question that is not answered by any neurocognitive theory. Also, theology may attempt to seek answers to the question of why the evolutionary process was utilized, or alternative biological science ought to be conducted into empirically based opposing theories that better explain the origins and development of life.

This article is an attempt to persuade proponents of IDT to construct a scientific theory and treat IDT as a scientific theory. As an evolutionist, I partake in this because I believe that the way science ought to work is by attempting to discover truth wherever it may be suggested and by submitting all practice that calls itself science to the rigor and stringency of scientific method. The future of society will be influenced by the development of religion as well as science. These are therefore important questions. May the future investigations and discoveries proceed in the light of open discourse and the determination to discover the world as it really is—be it contingently evolved or intentionally designed.

NOTES

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1. Johnson, a professor of law at the University of California, Berkeley, argues that modern evolutionary theory is not science but is founded on a preconceived materialist idea of the world as governed by natural laws, which do not allow for God's intervention. Johnson may be considered the most prominent member of the IDT movement (Johnson 1999). See Pennock 1999 and 2002 for critical exposition of Johnson's position. From Johnson's perspective, this essay would be aimed at making IDT a materialistic naturalistic discipline—thereby accepting the modern mainstream scientific method, as most would define it.

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