

Philosophy of Religion

Discussion

Reply to Stephen E. Parrish, “God and Objectivism: A Critique of Objectivist Philosophy of Religion” (Spring 2007) and Patrick Toner, “Objectivist Atheology” (Spring 2007)

Not Even False: A Commentary on Parrish and Toner¹

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Ayn Rand did not do philosophy as academic philosophy is customarily done, at the level of propositions. Propositions depend on concepts, and Rand insisted on validating each concept, before it was used, by a specific criterion: that it had been properly induced by a process of *measurement omission* (Rand 1990) from the evidence of the senses.

This was her approach, also, to propositions using the term “God”: Did this term refer to an instance of a valid concept? The term “God” cannot refer to a concept induced from direct, perceptual observation, since a “god” has never been reliably observed. Concepts, however, may also be induced from *indirect* measurements that are derived from direct observations and previously validated concepts, by logical and mathematical reasoning.

Therefore, Rand, and subsequently Peikoff (1991) in various places, examine the different attempts at indirect induction of a concept of “god” and conclude that no valid concept is induced from the purported evidence in those attempts. Rand and Peikoff do not dismiss most arguments for “God,” as is usually done in attempts to invalidate an argument in the context of non-Objectivist philosophies, for being *incoherent*. Instead, the reasoning for “God” is shown to be *arbitrary*, in the sense of not being traceable to the only way there is for information *about reality* to come *from reality* and enter the mind: the

The Journal of Ayn Rand Studies 9, no. 2 (Spring 2008): 361–94.

evidence of the senses. Theistic arguments are only *indirectly* incoherent, because it is incoherent to use a concept without first validating it by induction from evidence. Peikoff (1991, 30–38) also demonstrates that idealism and materialism (and therefore arguments based on idealism or materialism, and therefore those arguments for “god” that are based on idealism) are incoherent—but also only indirectly; comments about specific arguments for “god” in this section of Peikoff are meant only as illustrations of the general incoherence of idealism. Objectivism’s *direct* objection to the concept of a “god” is strictly that such a concept is not inducible, directly or indirectly, from the evidence of the senses by means of measurement omission, and for this reason is arbitrary, and invalid.

The first of the two articles addressed in this commentary, Toner (2007), misreads several comments by Ayn Rand and subsequent Objectivist scholars, particularly by Leonard Peikoff, comments that Toner calls “Objectivist Atheology.” His misreading may be ascribed to the lack of a systematic enumeration, in the Objectivist literature, of epistemic categories that relate propositions to knowledge of reality. Toner is also faced with the lack of a single, systematic treatment of the “god question” in the Objectivist literature, so that all that Toner has to work with is an occasional tangential comment in books and articles directed at other questions. For reasons detailed below, the “god question” is of little intellectual import to Objectivists. It was also, in Rand’s lifetime, of little or no existential import, as the main threats to human lives and freedoms, until the fall of the Soviet Union, came from collectivist ideologies that were not related (except perhaps historically) to religion. Subsequently, Heilbroner ([1993] 2007) disconfirmed, from newly available evidence about the fallen socialist economies, the key assumptions of Marxist economic theory and of “scientific socialism,” making the main ideology of collectivism untenable intellectually except as a statement of faith. Since then, theistic religion has become the primary driver of existentially important threats to human life (see the paragraph on *agency bias*, in the section on intuition, toward the end of this commentary). Intellectually, the “god question” is not any more interesting now than it ever was, but the resurgence of politically influential religion has given this question an unexpected existential relevance. Responding to Toner (2007) requires a systematic exposition of an

objective approach to the “god question.”

The second of the two articles that prompted these comments, Parrish (2007), presents numerous arguments, which vary greatly in their intellectual seriousness. Some of Parrish’s arguments depend on inserting an element contrary to Objectivism into some Objectivist comment, or prepending or appending it to an Objectivist comment, without identifying his addition as contrary to Objectivism, and then “demonstrating” the contradiction in the resulting chimera—which Parrish presents as a supposed defect, not of the chimera that he has created, but of the Objectivist argument. This procedure begins on page 171, where Parrish takes the idea of “the God of classical theism” and, without bothering to validate it by Rand’s criterion as a concept, combines it with various Objectivist arguments. It would have been legitimate for Parrish to argue against Rand’s criterion, or against Rand’s theory of concepts. It is not legitimate to combine what Objectivism considers a non-concept with Objectivist arguments—and then ascribe the resulting contradictions to Objectivism.

On page 204, Parrish inserts, into the Objectivist argument for naturalism, the Christian Church’s pre-Galileo version of Occam’s Razor “which states that *entities* should not be multiplied beyond necessity” (emphasis added). But according to Rand (1990, 72) it is “*concepts* [that] are not to be multiplied beyond necessity.”² Since Parrish has read *Introduction to Objectivist Epistemology*—he cites it among his “References”—it appears that this substitution was deliberate. It would have been legitimate to argue explicitly against the version of Occam’s razor that Rand states and uses. It is not legitimate to insert the older version silently into the Objectivist argument, and then proceed to attack the resulting chimera as though it were an expression of Objectivism. Below, I restrict my comments on Parrish to those of his arguments that do not use this technique.

To provide a context for understanding Rand’s and Peikoff’s arguments, I will begin with three intertwined inquiries: about the categories relating propositions to knowledge of reality; about the relationship of Objectivist epistemology to the implicit working epistemology of the objective sciences; and about the supposed evidence for a “God.”

Objectivism and the “God Question”

Objectivism does not have a cosmology, and does not deal, as a system of philosophy, with questions about the existence of specific entities whose existence is not axiomatic (Rand 1990, 289). Thus, the existence or nonexistence of a hypothetical existent such as a “god” is not, in the context of Objectivism, a philosophical question, but a scientific one. Everything that Rand and Peikoff wrote about the “god question” was intended, not as philosophy, but as an illustration of how the principles of Objectivist metaphysics and epistemology could be applied to the solution of specific questions, including scientific questions, in the context of whatever scientific knowledge was available, and known to them, at the time. Because scientific knowledge is contextual, it cannot be assumed that the same principles can be applied in the same way to scientific knowledge available decades later to a different person. In discussing the fallacy of “originalism” (in the context of philosophy of law, but in terms applicable equally to philosophy of science), Smith (2007, 256–57) writes that in “the terminology of Ayn Rand, concepts are open-ended (so that) the referents—the actual, concrete instances of that concept—are not a fixed, immutable set determined by the experience or knowledge of a particular speaker.” An objective (in the Objectivist sense) perspective on the “god question” today must be grounded, not in the state of science decades ago, or of any individual’s knowledge and experience at some time in the past, but in what is known to science now.

Objectivism and Science

Rand (1957) drew the outline and laid the foundations of her philosophical system in preparation for writing *Atlas Shrugged*. Rand’s last major project before *Atlas Shrugged* was to draft the screenplay of *Top Secret*, a proposed film about the Manhattan Project (Rand 1997). In her several interviews with scientists who had worked on the Project, Rand is at least as interested in scientific cognition—in how scientists do science—as in the specific history of events.

The history of the science that led to the development of nuclear weapons and nuclear energy cannot be understood without first going back two centuries. Harriman (2006a, 83–89) describes physics in the century from Newton’s *Principia* to the work of Euler, Lavoisier,

Lagrange, Laplace, Herschel, Coulomb and Watt by the 1780s—“Enlightenment science”—as “an amazing hundred years, when man’s knowledge extended beyond the Milky Way and penetrated into the nature of chemical elements, when man first discovered the force that causes lightning and the practical power of heat,” all based on a working philosophy of science essentially identical, except for Rand’s own original contributions, to the foundations of Objectivist epistemology. A central component of the working philosophy of Enlightenment science was Newton’s (Harriman 2007, 95) radical rejection of arbitrary hypotheses, as something that the scientist “should abstain from contemplating” (Thayer 1953, 6).

Yet even as scientists accomplished that “amazing hundred years,” other philosophers—for physicists still thought of themselves as working in a branch of philosophy—especially Immanuel Kant, were working on philosophical systems that radically undermined the implicit working epistemology of Enlightenment science, and resulted in what Reedy (1983) calls a *counter-revolution* against its philosophical foundations. Harriman (2006a, 107–13) details the perspectives on physics of eight philosophical followers of Kant. According to Harriman, the most influential of the eight was Hegel, who “defended the method of starting from mystical insights and deducing the nature of the world” (112). Following Hegel, it became fashionable among mid-nineteenth-century physicists, who still regarded themselves as philosophers, to claim—not even acknowledging the fact that the entire enterprise of theoretical physics consists of using logic and mathematics to form hypotheses that account for existing evidence, and that can be tested with further measurements and experiments—that it was legitimate to form hypotheses arbitrarily, without prior evidence, by means of intuition, imagination and so on. It was a variant of this idea that Rand addressed when she said (in a transcript included in Rand 1990, 305): “That is a very widely held and disastrous error today, not only in mathematics but in every science. And, of course, philosophy is the author of that error. I mean, the idea that it is legitimate to form arbitrary hypotheses. Never try to justify or to tie to reality, or to negate for that matter, some hypothesis, or some ‘What if?’ proposition, for which there is no basis at all. That is the dead end of human epistemology, and worse than that: That is a mind-destroyer.”

Harriman (2006b) documents some of the destructive results of the influence of Kant and Hegel on nineteenth-century science. The key evidence for the atomic theory was available by 1811 (89), but attempts to conform physics to prevalent philosophical doctrines prevented its acceptance for nearly a century (102). By the last quarter of the nineteenth century, progress in physics slowed down to a near standstill; most physicists believed “that little remained to be done but to measure physical constants to the increased accuracy represented by another decimal point” (Dampier 1949, 369).

The progress of physics only resumed toward the end of the nineteenth century and the first quarter of the twentieth, when young physicists, some of whom called themselves “Enlighteners”—a term that has been used to designate advocates of Enlightenment science since the eighteenth century (Reedy 1983)—deliberately returned in their work to the epistemic methods of Enlightenment science. And because, as Rand (1990, 305) was later to say, philosophy was the author of the errors that had hamstrung nineteenth-century physics, the “Enlighteners” proclaimed a separation of physics from philosophy. Some aspects of this separation proved counterproductive, in ways that are beyond the scope of these comments. The main thrust of the “Enlighteners,” however, was to return to Newton’s understanding “that to accept an arbitrary idea—even as a mere possibility that merits consideration—undercuts all of one’s knowledge” (Harriman 2007, 95). It was this return to the working epistemology of Enlightenment science that made possible the development of nuclear weapons and nuclear energy, and the many other breakthroughs and technological applications of twentieth-century science.

Rand interviewed Manhattan Project physicists in January 1946, shortly after the 1945 Nobel Prize in physics was awarded to Wolfgang Pauli (see Enz 2002 for details cited below) who was at that time Professor of Theoretical Physics at Princeton University. Pauli received the Nobel Prize for formulating the Exclusion Principle, the principle that two different particles in the same atom cannot have exactly the same values for all their attributes: if the values of all the attributes of two different particles in the same atom were exactly the same, they would be the same particle, and not two different ones. The Pauli Exclusion Principle in physics applies to *fermions*—electrons, neutrons, protons, neutrinos and quarks—the particles that make up

ordinary matter. The core of Rand's metaphysics—that existence is identity, and that an entity's identity consists of the values of its attributes—can be understood as an extension of Pauli's exclusion principle to *all existents*.

Since the time of Archimedes, theoretical physicists, armed with evidence from observations and measurements, have used logic (including mathematics) to answer the question, "What principles might account for what is observed?" The "golden century" of Enlightenment science began with Newton's principle that a claim about which there was no evidence was merely arbitrary, and did not even deserve to be contemplated as *possible*. Pauli was a vocal "Enlightener" (Enz 2002, 249) who, at seminars and conferences, condemned ideas that did not meet Newton's criterion, as "*not even false*" (Eisenberg 1994). One of the core ideas of Rand's epistemology can be understood as the extension of Newton's criterion, of requiring *grounding in the evidence of the senses* for scientific theories, to *all abstractions*, down to the level of concepts.

Rand's metaphysics and epistemology embrace the silent premises implicit in the work of the scientists whom she interviewed in 1946: that existence is identity; that an existent's identity consists of the values of its attributes; and that objective knowledge (knowledge without the possibility of illusion) about these values can be obtained by measurement: by comparing, in reality external to consciousness, the value of an existent's attribute with an equally external standard. Note that Rand's (1990) idea of measurement is very broad, and includes categorization and comparative observation. In addition to her best-recognized contribution, her method of grounding concept formation in objective knowledge by means of *measurement-omission*, Rand in her work on epistemology identified, integrated, generalized, described and explained the silent epistemology implicit in how scientists actually do science.³ In 1972, six years after Rand published her work on concept-formation by measurement-omission in *Introduction to Objectivist Epistemology*, physicist Alan Kay independently implemented an identical method for forming a class of instances in Object-Oriented Programming (Reed 2003). Because essentially all scientific theories in recent years have been formulated to permit evaluation with object-oriented computer models, the actual working epistemology of the objective sciences today is aligned (except for the

output of scientists who consciously use other epistemologies) with the principles of Objectivist epistemology. To apply Rand's epistemology to a specific existential question, including the "God question," one must do so in the context of currently available science.

The Possible and the Arbitrary

A philosopher more technical than Rand would have used a more technical expression, but *mind-destroyer* (Rand 1990, 305) is an accurate description of what *accepting the arbitrary as knowledge* does to cognition. Our faculty of cognition requires, among other things, an information-processing system. But human cognition, unlike any intelligently designed artificial information-processing system, does not have an automatic garbage collection mechanism designed to find and destroy data objects that have no referents. It does not even have a way of tagging arbitrary ideas to keep them from being used as though they referred to something.

If an information-processing system that lacks a garbage-collection mechanism allows itself to accumulate data structures without referents, its resources will be eventually overwhelmed, clogged by non-information that refers to nothing. It will cease to function, just from trying to deal with the arbitrary as though it were dealing with the possible. The human mind, which does not automatically tag ideas that are not based on evidence of reality, is in an even worse situation: once an idea that is not grounded in measurement or observation of anything real is accepted into the mind as though it were, and is combined with other ideas to form new ones, the mind loses its ability to guide the organism reliably in dealing with the real world in which it lives. Man's mind is his only means of survival. Men who treat non-knowledge as though it were knowledge, and adhere to religious or pseudo-secular ideologies that reify the arbitrary, will tend to die of this error and to kill in its name, especially when the incorporation of arbitrary ideas into the mind is combined with intuition (intuition is discussed at greater length toward the end of this commentary).

The human mind's only defense against destruction by non-knowledge is to exercise cognitive hygiene: either explicitly identify all arbitrary claims in one's mind, or refuse to accept arbitrary ideas into one's mind in the first place.

This is not a case of naive empiricism, because Objectivism recognizes, by integration of facts of reality originally induced from the evidence of the senses, several axiomatic preconditions of knowledge (such as free will, and therefore the existence of metaphysical indeterminacies—see the section on theistic arguments from free will, below). Axioms, once they have been induced and integrated from prior observations, and understood, become the foundation of subsequent knowledge that depends on them.

Moreover, Objectivism does not discount all knowledge that comes from non-systematic observations, even after measurement has been discovered and axioms arrived at, since it is not necessarily unreasonable, in contexts (such as, for example, the study of history) in which measurements are not available, to give propositions that arise from such observations a presumption of being likely to be true. This presumption, however, ought to be tested against objective measurement in contexts in which this is possible, because measurements, unlike happenstance observations, are capable of producing knowledge that is *contextually certain*.⁴ In any case, one cannot claim, as *knowledge of reality*, any proposition that is not actually known to be grounded in reality by way of the evidence of the senses.

Therefore, Objectivism distinguishes the arbitrary from the possible. In the context of Objectivist epistemology, the possible refers to ideas that have evidence both for and against them, as when a proposition is known to be true in some contexts, and is known to be false in other contexts, and one does not know in which of those categories the specific context at issue belongs. For example, if it has rained on some days with conditions similar to those expected for tomorrow, and it has not rained on other such days, then it is possible that there will be rain tomorrow, and it is also possible that there won't be. It is reasonable to treat the idea that it will rain tomorrow as a possibility, perhaps to plan precautions in case it does rain. If a possibility is disconfirmed, as when it turns out that it did not rain, one identifies the previously "possible" idea as false, and removes it from one's mental knowledge base. But if there just isn't any evidence from measurements or observations for or against some idea, then there is no prospect for it to be either confirmed or disconfirmed later. The rational mind's only remaining defense is to refuse to treat the arbitrary as "possible." Peikoff (1991, 164) puts it

this way: “an arbitrary claim is automatically invalidated. The rational response to such a claim is to dismiss it, without discussion, consideration, or argument.”

A diversion of one’s mental and existential resources, to phantasms for which there is no evidence, inevitably detracts from the proper use of those resources to preserve and enhance one’s life on Earth. Therefore, an Objectivist integration of facts about the relation of the arbitrary to one’s life goes directly against the popular saying that “absence of evidence is not evidence of absence.” Absence of evidence justifies a *working presumption* of absence. Without evidence that there is a “God,” or that a convention of gremlins is studying Hegel’s *Logic* on the planet Venus,⁵ a reasonable person will not spend any of his time, or any of his intellectual or existential resources on thinking or acting as though such things were to be even considered as possible. While the absence of evidence for an idea does not make it incoherent, it does make that idea arbitrary. It therefore makes any consideration of that idea contrary to the proper use of reason.

The Epistemic Status of Propositions

From Rand’s positions, and her and Peikoff’s (1991) endorsement of the principle (traced by Harriman 2006a to Newton) of excluding the arbitrary, one may infer 8 categories of epistemic status:

1. Axiomatic: propositions that cannot be denied without precluding knowledge *qua* knowledge.
2. Incoherent: propositions that violate the laws of logic or other axioms implicit in knowledge *qua* knowledge.
3. Contextually certain to be true: propositions stating what has been objectively measured, within the range (the contextual scope; see the discussion of context-tracking in Reed 2003, 273–74) of the measurements by which it was measured; or propositions logically entailed by some combination of axiomatically true propositions with propositions that are contextually certain in the given context.
4. Contextually certain to be false: propositions precluded by what is contextually certain to be true.
5. Probably true, and reasonably presumed, at some level of confidence, to be true: propositions for which there is supporting evidence, albeit short of Objectivist criteria for contextual certainty,

and no evidence against.

6. Probably false, and reasonably presumed, at some level of confidence, to be false: propositions against which there is some evidence, also short of contextual certainty, with no evidence for.

7. Possible, sometimes with a specifiable level of expectation: propositions with evidence both for and against, as when a proposition is known to be true in some contexts, and known to be false in other contexts, and one does not know whether it is true or false in the specific context of interest.

8. Arbitrary, when a proposition is invented without any actual evidence about it, either for or against. Objectivist epistemology places the arbitrary in, metaphorically, the lowest level of epistemological Hell. Peikoff (1991, 166) writes that “In a sense, therefore, the arbitrary is even worse than the false. The false at least has a relation (albeit a negative one) to reality; it has reached the field of human cognition, although it represents an error—but in that sense it is closer to reality than the brazenly arbitrary.” Peikoff also discusses other aspects of excluding the arbitrary, which are beyond the scope of this commentary. In any case, the arbitrary is, as Wolfgang Pauli first put it, the *not even false*.

Misunderstanding the Objectivist Argument About God

Given the above categories of epistemic status, it becomes possible to identify Toner’s misunderstanding of the Objectivist argument about a “God.” With regard to theistic notions, Toner writes “that there is not the kind of *incoherence* in these notions that Objectivists say there is” (2007, 224; emphasis added). But Objectivists do not claim that theistic notions are incoherent,⁶ which would place them in category (2) above, but rather that these notions have no evidence for them or against them, so that they are arbitrary—category (8).

Theistic notions violate the preconditions of knowledge, not by being incoherent, but by having been postulated without grounding in objective measurement, or in any evidence of the senses. The specific arguments that Toner writes about were not meant to show that common adductions of “evidence” for theism were *incoherent*—only that they sometimes depended on incoherent arguments or

notions, such as the notion of the “supernatural,” and in any case did not amount to *evidence*. In the absence of evidence, the razor, on this or any other scientific question, is that concepts are not to be multiplied without necessity. And only evidence from measurement or systematic observation counts as necessity. Objectivism, like science, dismisses theistic notions not because they are internally incoherent, but because they are not grounded in objective evidence, and therefore are not necessary.

The Claim of “Thought Experiment”

In order to make his argument against the Objectivist arguments on the “God question,” Toner asks the reader to participate in what he calls a “thought experiment”: to imagine himself as a theist (218).

Toner borrows the term “thought experiment” from the discipline of theoretical physics, in which this term refers to a legitimate and productive conceptual method for checking the coherence of proposed explanatory principles. The thought experiment is a hypothetical context in which to explore the implications of a proposed principle. In physics, or the other objective sciences, such a hypothetical context is constructed *exclusively* from elements that are known, on the basis of already available evidence, to be actually possible in reality: a gun triggered by a particle detector, or future space travel at speeds approaching the speed of light, and so on.

By presenting a begging of the question as a “thought experiment,” Toner cloaks a grade-school fallacy—begging the question—in the prestige of a method of theoretical physics. Instead of imagining a new combination of elements that are already known to be *possible* in the scientific and Objectivist sense, Toner is asking the reader, if the reader is an Objectivist, to imagine something arbitrary: specifically, to imagine myself as a theist. But to perform this feat I would also need to assume (because as an Objectivist I choose not to believe any non-axiomatic claim without specific evidence) that there *is* objective evidence for the existence of a god. Since Toner is using the pretense of this “thought experiment” to attack Peikoff’s arguments *against* the existence of such evidence, he is simply asking the reader to assume, in advance, that the conclusions of the Objectivist arguments are false. And then, if one ignores the obvious fallacy of begging the question, the arguments are predictably demolished.

But what if evidence for theism existed? Toner claims that it does, not in the old arguments addressed by Rand and Peikoff, but in new ones: “Still less can theistic claims simply be dismissed as ‘arbitrary’ (as defined by Peikoff 1991, 164), since theists, in fact, have a huge array of tremendously impressive arguments to muster in support of their position” (228–29). Toner provides references to those supposedly impressive arguments in his footnote 24 (234). Parrish (2007) is less reticent, sprinkling references to those new arguments throughout his article.

Those new arguments come from two directions. One is that science deals only with material things, so that the scientific and Objectivist criterion of identification by measurement is not applicable to consciousness—and that consciousness itself is inherently beyond the reach of measurement. This tack argues that the very existence of consciousness in an otherwise material universe is intrinsically inexplicable by science, and must be ascribed to a God, for whose existence it constitutes irrefutable evidence in itself. The second tack is that there is *scientific*, measurable evidence of the existence of God. Since Rand considered a question about the existence of any specific entity to be a scientific question, rather than a philosophical one, I will proceed by examining these claims in the light of available scientific evidence.

Consciousness and Information

In the context of Objectivism, “consciousness is the faculty of awareness” (Rand 1990, 37). Awareness is not an existent or a substance, but an experience: being *aware of an object* is how one experiences attending, with one’s mind, to *information about that object*. The object of an awareness is *what* one is aware of; attention to the information that identifies the given object is the means by which one is aware of it.

That one’s own consciousness exists is axiomatically true: one cannot claim to know anything, even within one’s own mind, without being aware that one knows it. The consciousness of others, however, is in the category of the reasonably presumed to be true: they have brains similar to one’s own, and therefore when they describe their experience of being aware in terms similar to one’s own experience of being aware, it is reasonable to presume that their

descriptions of *their* awareness result from their being similarly aware.

The consciousness of others can be made contextually certain by the same means by which any fact can be made contextually certain: by measurement. Because one is aware of objects by means of information that identifies those objects, one can measure consciousness by measuring the information on which it is based. Information—in the ordinary sense of being informed of the values of the attributes of some object—depends on information in a technical, measurable sense (Shannon 1948). In this technical sense, *information* is a set of attributes shared by two or more sequences (or finite-dimensional patterns) of values of attributes of different existents by virtue of a *causal correspondence* between (or among) those sequences (or patterns). In the case of human consciousness, this causal correspondence results from the operation of the sense organs. Objective measurements of consciousness include measurements of the rate at which information in consciousness is used to make conscious decisions (Hick 1952; Hyman 1953), of the number of items of information of which one can be simultaneously aware (Miller 1956 and many others), of the discriminability of information in consciousness (Swets 1995), of the rate of mental rotation of imagined objects (Shepard and Metzler 1971), and so on. Because awareness is simply how one experiences having information that identifies the object of the experienced awareness, awareness and information are inseparable. There has never been a measurement or a reliable observation of awareness—of consciousness—without information. In the absence of any measurement or reliable observation, a claim that awareness can exist without information cannot be other than arbitrary.

The study of the properties of information in the technical sense has been an objective science since Shannon's (1948) discovery of how information can be measured. In that time, information has never been measured, or even reliably observed, except in the form of patterns of values of attributes of physical entities—of matter and energy. The presence or transfer of information always requires what is called, in the information sciences, a *physical layer*: a physical *medium* consisting of matter or energy—such as neural impulses in the brain, patterns of ink on paper, photons, waveforms of electrical potentials or currents and so on; and a method of *modulation*, a mapping between patterns of values of the attributes of that medium, and the informa-

tion that the physical layer stores or conveys (see, for example, Zhang et al. 2006). Thus, the idea of information without matter or energy is also arbitrary. Only physical entities can be conscious. The idea of a non-physical consciousness that preceded and created the physical world is built on the arbitrary: it must presuppose either the existence of consciousness without information; or the existence of information without a physical medium for it to be present in or conveyed by. Without some kind of evidence for either of these presuppositions, the idea of “a consciousness that existed before there was a material, physical world” is just an arbitrary phantasm: *not even false*.

Trying to Find Evidence of a God

Any attempt to argue from measurements and observations for the existence of an unmeasurable, unobservable “God” must necessarily focus on this supposed God’s supposed influence on things that *can* be measured or observed. Current claims for “evidence” of divine influence fall into two categories: “God of the gaps” and “God of the dice.”⁷

God of the Gaps

The “God of the gaps” refers to the presumption that some gap in current scientific knowledge cannot be closed without presuming some kind of divine, supernatural action. The history of “God of the gaps” arguments would not encourage an honest believer: two of the three gaps on which “God of the gaps” arguments in current circulation are based have been closed already, while another argument was based, until recently, on a misperception of a gap that didn’t exist. Science, however, does sometimes open new gaps as old ones are closed, and so one new “God of the gaps” argument was added recently to replace the missing one. The following is a list of currently circulating “God of the gaps” arguments that I am aware of:

1. The “Big Bang”

There is astrophysical evidence that approximately 13.7 billion years ago the observable portion of the universe exploded from a singularity. The “Big Bang” was first hypothesized to explain the observed ongoing expansion of the visible universe by Georges Lemaitre (1927). Lemaitre was also a Roman Catholic priest, a fact

that may have contributed to the subsequent popular interpretation of the singularity in terms of the Judeo-Christian creation myth. There is, however, no actual evidence to suggest anything resembling the creation myth. Specifically, there is (1) no evidence for the popular belief that the universe did not exist before the singularity; (2) no evidence for the belief that matter and energy did not exist before the singularity; and (3) no evidence for the belief that physical laws did not exist, and work, before the singularity. The gap, until the mid-1990s, was that we had no specific, evidence-based explanation of the Big Bang. However, in the absence of evidence to the contrary, the most epistemologically parsimonious presumption—the one that does not multiply concepts beyond necessity—was always that the Big Bang singularity came about as a result of the same physical laws that scientists observe and measure in the observable universe, and that the Big Bang gap in scientific knowledge would be eventually filled—using the same epistemology by which science had filled previous gaps.

In the mid-1990s, this gap was filled. Observation and measurement of Black Holes (see Thorne 1995 for an overview) led physicists to conclude that every Black Hole has a Big-Bang-like singularity at its origin, as well as its own *miniuniverse* emanating from that singularity (Cavaglia et al. 1995). A Black Hole's "miniuniverse" is really a *subuniverse*: like the Black Hole it belongs to, it is a part of the universe, and not a miniature replica of it. The most parsimonious explanation of *our* Big Bang (involving no new concepts beyond those required to account for already available measurements and observations of Black Holes) is that we live in the local subuniverse of a very large Black Hole, which was created by the natural gravitational collapse of a part of the universe (or of a part of a still larger Black Hole's miniuniverse, and so on recursively) 13.7 billion years ago. Our own post-Big Bang subuniverse exists within, and is a part of, the encompassing natural universe. There is no evidence for the belief that the larger universe had a "beginning" or a "creation."

2. Free Will

It is axiomatically true that knowledge would not be possible in a deterministic brain: if one's decision as to the truth of some idea were predetermined, then one would not be able to make a decision

contrary to what has been already predetermined, and thus one would be in no position to arrive at knowledge. Except for its axiomatic necessity as a precondition of conscious knowledge, there is no observable evidence for free will.

The Objectivist interpretation of free will is that one is free to focus mentally on the solution of a problem, in the sense of assembling and integrating all the information relevant to the solution of this problem, to any extent ranging from complete mental focus, at which point the solution is fully determined by the information that one has assembled and used, to increasing degrees of mental unfocus, which leads to increasingly random results (Peikoff 1991, 56–62). This view of volition requires not just any indeterminacy, but a specific kind of physical indeterminacy, such that the contribution of randomness to specific neural events in the brain will increase with the increasing departure of consciousness from full mental focus.

Prior to the discovery of unpredictable phenomena at the quantum level, physics was strictly deterministic. Its implicit model of causality was a so-called “billiard-ball” model of strictly deterministic event-event causation (16–17). This model of physical causation left no room for volitional indeterminacy except by some kind of divine intervention.

In the late nineteenth and early twentieth centuries, physicists discovered several phenomena that proved difficult to explain using the (by that time traditional or “classical”) “billiard-ball,” event-event model of physical causation. In what eventually came to be known as “quantum physics,” some systems of physical equations were found to have either multiple solutions or a continuum of solutions. The phenomena described by those systems of equations appeared to require a return to entity causation, an alternative model (dating back to Aristotle, and later also incorporated into Objectivism—see Peikoff 1991, 16–17) under which all events are actions or behaviors of entities, and every action is caused by the nature of the acting entity; interactions are caused by the properties of the system of interacting entities, etc. Entity causation is perfectly compatible with certain kinds of indeterminacy. For example, in the case of nuclear decay, the nature of the decaying nucleus causes it to decay in a specific way, with a specific likelihood per unit of time, but without a uniquely predetermined, specific instant of time at which the decay must take

place. At the level of interactions among atoms and molecules, including interactions under conditions that actually obtain in the human brain, the systems of physical equations that predict the future state of the physical system have multiple solutions. Each solution corresponds to an “*eigen-state*,” a specific future state of the system. The system causes its future state to be among those specific states, but does not predetermine which one.

While early twentieth-century physics recognized that the behavior of physical systems was not necessarily predetermined, it was not clear how the indeterminacies of quantum systems might be involved in volition. The situation was further obscured by the “Copenhagen Interpretation” of indeterminacies in quantum-physical systems, generally ascribed to the work of Niels Bohr and Werner Heisenberg around 1927. According to the Copenhagen Interpretation, events described by systems of equations with multiple solutions result in a “superposition” of the several *eigen-states*. This “superposition” then persists until the system is forced to “collapse” by measuring some property that has different values in the different *eigen-states*. Thus, the Copenhagen Interpretation was formulated in terms of an *observer’s* acquisition of knowledge. And a human observer’s acquisition of knowledge is a function of consciousness. The result of the quantum “collapse” appeared to be *unconditionally* random, and thus difficult to relate to neural function in the brain, or to free will. Popular association of consciousness with God again led to a belief that free will is not explicable in natural terms, and that it requires some kind of direct supernatural intervention.

Giving consciousness a place in physics, as the Copenhagen Interpretation had done, is directly contrary to the scientific and Objectivist principle of *primacy of existence* (17–23). Bohm (1952a; 1952b) proposed an alternative interpretation of quantum mechanics in terms of strictly deterministic event-event causation, ascribing observed randomness to the effect of “hidden variables” that could not be observed, measured, affected or controlled in any way. Bohm’s strictly deterministic interpretation restored an apparent primacy of existence in physics, at the cost of precluding any possibility of a natural explanation of volitional consciousness. This was a result that Bohm (1990), an explicit adherent of mysticism, wanted and welcomed.

The free will gap is now closed, thanks to a new interpretation of quantum mechanics by Zeilinger (1999).⁸ Zeilinger's interpretation eliminates the Copenhagen Interpretation's dependence on primacy of consciousness, and restores the primacy of existence to non-deterministic, entity-causation quantum mechanics, by using the concept of *information* (in a technical sense, separate from the ordinary sense of information as specific knowledge) that is due to Shannon (1948). This separate, technical concept of information, as used since Shannon in the information sciences, refers to a set of attributes shared by two or more sequences (or finite-dimensional patterns) of values of attributes of different existents, because of a *causal correspondence* between (or among) those sequences (or patterns).

The causal correspondence in this definition was, in the original instances of *information* in the technical sense (Shannon 1948), a product of human agency; for example, the transduction of sequences of acoustic vibrations into sequences of electrical currents and then back into acoustic vibrations in telephony. The causal correspondence in those original instances was always caused by a device, such as a microphone or a speaker (another term designating separate conscious and technical concepts) designed and created by conscious humans for the specific purpose of causing that correspondence.

Subsequently, it was discovered that correspondence-causing mechanisms also existed, as a result of evolution, in biological organisms, including organisms that existed before the evolution of consciousness. Those correspondence-causing mechanisms (for example, the enzyme reverse-transcriptase in retroviruses) could not have involved consciousness or agency in any way whatever. Since the correspondences caused by those mechanisms could be studied by means of the concept of information, whose epistemic essentials were thus known to be independent of agency and consciousness, it became clear that this concept had more general applicability than its original applications in engineering might suggest. Eventually the concept of information in the technical sense found applications in crystallography (for example, in accounting for symmetry in snowflakes) and in Zeilinger's (1999) interpretation of quantum mechanics. The relationship of information and consciousness is strictly one-way: while consciousness requires and depends on information, information in this technical sense does not depend on, or require, the prior

existence of consciousness.

In Zeilinger's interpretation, the collapse of a quantum system into a random *eigen*-state happens when a process extracts information from a quantum system (instrumented measurement is one category of such an information-extracting processes, but no necessary relation to consciousness is expected or required of such processes in general) that does not contain enough information to specify one specific *eigen*-state. Thus, indeterminacy and randomness are conditional on the *absence* of enough information to select a specific result. This corresponds exactly to the specific kind of indeterminacy required by Rand's (Peikoff 1991, 56–62) view of free will. Full mental focus means integrating all the relevant information (in the ordinary sense) to arrive at reliable knowledge. This corresponds to the presence, in the neural structures and processes responsible for awareness and knowledge in the brain, of enough information to determine one specific *eigen*-state and one specific result. When a human mind is less than fully focused on a problem, the amount of available information must be less than this—and the contribution of random indeterminacy to the result will increase. Zeilinger's interpretation of quantum mechanics provides *a strictly natural account of volition*—one that leaves no gap at all for a god to fill.

3. “Intelligent Design”

The so-called “Intelligent Design” claim is discussed here even though only the second, more recent version of that claim, “Quantitative Intelligent Design,” qualifies as a “God of the gaps” argument. In its original form, it was not even based on a real gap in current scientific knowledge.

Both versions of “Intelligent Design” have been presented to the public as allegedly normal, secular science that makes no prior claims about the identity of the supposed “designer.” However, if the “designer” were simply another natural being, it too would have had to be “intelligently designed,” under the claims of “Intelligent Design,” by something else (Lockitch 2005). Short of an infinite regression of natural designers, that something else would have to be supernatural. Peel away this exercise, and one is back in plain “God of the gaps” territory.

Version I of “Intelligent Design” is based on the idea of

“irreducible complexity.” “Irreducible complexity” is the claim (Behe 1996) that no part of an “irreducibly complex” biological system, and no component similar enough to such a part to have had a common evolutionary origin, has any imaginable adaptive value except as a part of the whole system. In contrast to “irreducible complexity” there is also “reducible complexity,” which means that an evolutionary pathway leading to the observed system has been identified. Not surprisingly, all biological systems of whose evolution there is a fossil record, regardless of any quantitative measure of complexity (such as Kolmogorov Complexity; see Li and Vitanyi 1997) are considered by advocates of “intelligent design” to be only “reducibly” complex. This includes the mammalian middle and inner ear, which at the end of its complex evolution consists of components so well and exclusively suited to their current function, that as recently as Gish’s 1985 book its existence was claimed as definitive evidence for divine design of organisms. Thanks to the fact that most components of the middle and inner ear are bones, or are situated within channels in bone, its fossil record is now among the most complete for any complex biological system. It turns out that the ear’s highly specialized elements are direct descendants of structures that in their earlier evolutionary history had different functions. The two most specialized ossicles of the middle ear, the malleus and incus, evolved from the articular and quadrate bones of the lower and upper jaw of ancestral reptiles (Luo et al. 2001; Wang et al. 2001; Kardong 2002).

All complex biological systems that have a fossil record are the result of a two-step evolutionary process (Muller 1918; 1939): the *assimilation* of elements, one by one, into the system, followed by *coevolution*.⁹

Assimilation adds a part to the system when, as a result of a random mutation or a change in the environment, an element begins to contribute more to the inclusive fitness of the organism as a part of the given system (such as the auditory system) than by its previous function (articulation of the jaws). Thus, the first step in the evolution of the articular and quadrate bones into the malleus and the incus was their assimilation into the auditory system: they happened, as a result of the evolution of a second joint articulating the jaws in the therapsids, to have become redundant for articulating the jaws, and thus relatively more important in conveying sound to the eardrum.

Coevolution is the subsequent process of evolutionary optimization of system components for their roles in the evolving biological system. It is by coevolution that an element may become indispensable to the functioning of the system, and lose those characteristics that made it adaptively useful in its previous function. Natural selection selects characteristics that improve the performance of the system and thus increase the inclusive fitness of the organism. Characteristics that de-optimize the performance of the system are de-selected. Over enough generations, coevolution may result in components so specialized for optimal operation of a complex biological system that it becomes difficult even to imagine their ancestral function. But no failure of any observer's imagination can count against the conceptual explanation based on those cases for which the fossil record is available. Concepts are not to be multiplied beyond necessity. Unless there is separate evidence for an alternative explanation, the most epistemologically parsimonious account of the origin of any complex biological system, even of one that could not have left a direct fossil record of its own, is that it, too, evolved by assimilation and coevolution.

The original "Intelligent Design" claim of Behe (1996) was that ten complex biological systems—all of them pertaining to biochemistry or to cellular microstructure, and thus incapable of leaving a conventional paleontological fossil record—consist of components that have no imaginable biologically adaptive function outside their "irreducibly complex" system. Thus, Behe claimed, they could not have been assimilated into the given system after having evolved with different functions, so that the system can only be explained by divine intervention, which he called "Intelligent Design." Since then, however, parts of two of the systems selected by Behe as paradigms of "irreducible complexity" have been found to have adaptive functions outside those systems.

In one case, the bacterial flagellum, an analysis of bacterial genomes was used to arrive at a complete evolutionary pathway by which the bacterial flagellum is likely to have evolved, through DNA recombination—an event that occurs naturally in bacteria—combined with the previously identified two-step mechanism of assimilation and coevolution (Desmond et al. 2007). In the second case, the mammalian blood clotting system, Jiang and Doolittle (2003) found that the

corresponding system of the puffer fish completely lacks 3 of the 28 proteins of the mammalian system, but is already functional—just less functional, as would be expected if the mammalian system were the result of the subsequent assimilation of, and coevolution with, the three additional proteins. These findings make clear that some of even the ten systems selected by Behe as paradigmatic examples of “irreducible complexity” fail to meet his own criteria. It was Behe’s imagination, and not evolutionary science, that came up short. Behe continued to claim that the remaining eight were still “irreducibly complex” and could only be explained by “Intelligent Design,” but that claim was now even more obviously in violation of normal scientific epistemology.

Behe (2007) introduces a second version of “Intelligent Design”: “Quantitative Intelligent Design” or “Intelligent Design II.” This version is based on calculations by Dembski (2004) that the evolution of complex systems requires higher-than-average rates of mutation and selection. The gap in current scientific knowledge is that the process by which organisms regulate the rate of mutation is not yet known. This leaves room for a “God of the gaps” argument: to permit the evolution of complex biological systems, and to permit speciation, which may also require a high mutation rate, “God intervenes” and accelerates the mutations. Version II is no longer about “design” in any recognizable sense of that word; Behe (2007) apparently keeps the label so as not to acknowledge the defeat of version I.

The new gap—that the process by which organisms regulate the rate of mutation is not yet known—is not likely to be long-lived. The science of biology is well-practiced in the identification of biochemical regulatory mechanisms, and by now the identification of another such mechanism is not likely to take more than another decade or two. In comparison with the two gaps that had been filled with God for most of the previous century, this one remaining gap in natural science is remarkably unimpressive.

God of the Dice

The “God of the Dice” argument is the argument that the outcome of some unique event was so improbable that it would not have occurred without supernatural intervention. It is based on two

related misunderstandings of probability. One is confusion between the epistemic status of an outcome as an *a priori* likelihood, and as a subsequent fact. The second is confusion about the nature of the evidence that is objectively required for a claim of statistical significance, that is, of objective evidence for the claim that an observed outcome is unlikely to be the result of a purely random event or events.

The confusion between the epistemic status of an outcome as an *a priori* likelihood, and as a subsequent fact, is often taught in middle school grades as the “State Lottery” or “National Lottery” fallacy: “The National Lottery must be rigged; how else could it have been won by a player whose chance of winning was less than one in ten million?” Every outcome of a random process is unlikely *a priori*, but every random process has *some* final outcome, and afterward that outcome, no matter how unlikely beforehand, becomes just another fact of reality. Therefore a legitimate claim of non-randomness requires, at minimum, statistical significance: a divergence of the observed distribution of results from a purely random distribution. But the concept of a distribution requires multiple observations, because the variance of the distribution (the measured variability with which to ground the expectations to which the eventual outcome can be compared) cannot be calculated from a single instance (the concept of “variability” simply does not apply to a single observation). It is only with multiple observations that one can arrive at a presumption that a process is rigged: if former school classmates of lottery employees win more than their expected share of lottery drawings, then there is reason to suspect that something not exactly random is going on. But with only a single outcome to go on, no possibility of statistical significance, and no evidence of a mechanism by which the lottery might have been rigged, there is no evidence at all. What all the “God of the dice” arguments have in common is exactly that: a single observation, and no mechanism.

1. The Anthropic Principle

The “Anthropic Principle” (Barrow and Tipler 1986; Bostrom 2002) refers to the fact that the fundamental constants of physics all have values compatible with the existence of carbon-based life. If those constants had sufficiently different values, carbon-based life,

including intelligent life, would not be possible. The argument for “God” from the Anthropic Principle is that because we do not know why the physical constants have the values that they have, it must be that those constants could have had different values; if they could have had different values, there must have been divine intervention into what, without divine intervention, would have been a random process likely to produce a universe in which the physical constants would have had values incompatible with the eventual emergence of human life.

There is no evidence for the belief that the physical constants could have had values different from what they are. Since the physical constants have the same values in all the contexts in which they have been measured, the most reasonable presumption is that they have those values in other contexts as well. The fact that we do not know at this time why the actual values of the physical constants are what they are, is neither evidence nor a valid argument for the belief that in the absence of divine intervention those values would have been set by a random process.

Yet even if someone were to discover evidence that the values of the physical constants resulted from a single instance of a random physical-constant-setting process or event, this still would not constitute evidence of divine intervention to rig the result in favor of carbon-based life. Every random process has a result, and that result, however unlikely it may have been *a priori*, is the actual result that happened in reality. If the result had been different, we would not be here to know it. Since we are here, and the constants are what they are, then if the physical constants were the result of a random process, they still are nothing more than a random result. After all, the very concept of a random process that may have an unlikely outcome, is a concept of knowledge that exists only as information in the human brain. If the physical constants had happened to get set to values different enough to make life and knowledge impossible, the universe would still exist. But we would not be here to know that it exists.

2. The Evolution of the Faculty of Knowledge

The allegation that a natural evolution of the human faculty of knowledge would have been highly improbable, without divine intervention, to result in minds capable of knowledge, called the

“evolutionary argument against naturalism,” is due to Alvin Plantinga (1993; Beilby 2002). Plantinga argues that because behavior is caused by both belief and desire, and desire can lead to false belief, there are many ways in which beliefs could be false but adaptive, and natural selection would have no reason for selecting true but non-adaptive beliefs over false but adaptive beliefs. His argument postulates that the mental faculty of motivation, which he calls *desire*, has no evolutionary history prior to the evolution of human cognition, and therefore that human desires at the beginning of the evolution of the cognitive faculty were not a result of prior natural selection, but rather arbitrary, and unrelated to the requirements of life. Since action is the joint result of motivation and cognition, and he postulates motivation to be arbitrary, Plantinga (1993, 225–26) argues that natural selection would not have favored reliable cognition, except by chance:

Perhaps Paul very much likes the idea of being eaten,¹⁰ but when he sees a tiger, always runs off looking for a better prospect, because he thinks it unlikely the tiger he sees will eat him. This will get his body parts in the right place so far as survival is concerned, without involving much by way of true belief. . . . Or perhaps he thinks the tiger is a large, friendly, cuddly pussycat and wants to pet it; but he also believes that the best way to pet it is to run away from it . . . Clearly there are any number of belief-cum-desire systems that equally fit a given bit of behavior.

Plantinga’s postulates about animal motivation are, as Wolfgang Pauli would have said, *ganz falsch*—entirely counterfactual. Every measurement, or even simple observation, of the behavior of apes, and of primates belonging to lineages that existed before there were apes, and of mammals of lineages that existed before there were primates, and of many even earlier animals, shows both that the evolution of functionally adaptive motivation pre-dates the evolution of cognition above the level of simple perception, and that the motivation faculty of pre-human lineages favors, as would be expected from an outcome of natural selection, the inclusive fitness of the relevant populations (Colgan 1989; Damasio 1994; Batali and Grundy 1996). An animal that “liked the idea of being eaten” would have been eliminated from

the gene pool long before the start of the evolution of any specifically human faculty.

Yet even if the evolution of capacity for knowledge had been somehow a matter of chance, and improbable, one can hardly argue from its result that evolution was rigged. If a brain capable of knowledge had never evolved, then no matter how likely such a result might have been *a priori*, no animal living afterward would have been able to identify the process, or its outcome, or anything at all.

Intuition

My discussion above was addressed mainly to Toner's (2007, 228–29) statement that “theistic claims (cannot) simply be dismissed as ‘arbitrary’ (as defined by Peikoff in his 1991, 164), since theists, in fact, have a huge array of tremendously impressive arguments to muster in support of their position.” These “tremendously impressive arguments,” also sprinkled throughout Parrish's (2007) article, turn out to be based on nothing more impressive than counterfactual postulates, vulgar misunderstandings of scientific concepts, temporary gaps in the scientific understanding of nature, fallacies adequately exposed in the standard middle-school treatment of elementary probability and statistics, and claims made without any objective evidence at all.

Why, then, does my comment dwell at such length on this one statement? It is because Objectivism, like science, insists on a focus on the measured and systematically observed facts of reality. Toner's reference to the theists' allegedly “impressive” arguments is the only point of contact between his article and any claim, however tenuous, that theism can be grounded in actual evidence of the facts of reality. The rest of Toner's article is one long appeal to intuition.

In her discussion of the sources of mysticism, Rand (1982, 62) lists intuition, together with revelation and instinct, as illegitimate pretenders to consideration as means of knowledge. Rand did not discuss intuition at length, perhaps because in her time so little was known about it. Objective studies of intuition are recent, dating only to Tversky and Kahneman (1973).¹¹ Intuition is a human faculty that is likely to have evolved as a shortcut to decision-making under conditions of uncertainty. Just as emotion is properly used only as an automated, pre-programmed shortcut to making decisions when one

has no time to think, intuition is properly used only as a shortcut to making decisions when one does not have the time (or when it is not worth one's while) to obtain more reliable knowledge by investigating, observing, measuring and integrating all the facts of reality that one would need to make a reliable decision.

Intuition is driven by two types of shortcuts, which Tversky and Kahneman (1973; 1974) call "heuristics" and "biases." The term "heuristic" is borrowed from computer science. Computer science distinguishes between information processing methods that are known (by logical and mathematical proof) to be reliable, called *algorithms*, and those that are not known to be reliable, but that can produce usable results often enough to be sometimes worth trying, called *heuristics*. In computer science, the key to using a heuristic is the availability of a reliable test, by which one can determine whether or not a potential solution produced by a heuristic is in fact correct before one puts it to use. If such a test is available, and the heuristic and the test together take much less time (or other resources) than the best available algorithm, then the heuristic is worth trying.

In the analogy to computer heuristics, mental heuristics are procedures that evolved because they were adaptive enough to favor inclusive fitness, in spite of not being objectively reliable as genuine knowledge. The most important problem with using intuitive heuristics as though they were a means to knowledge, is that in many cases there is no way to test the result of a mental heuristic to determine whether or not this result is correct. The second is that most users of the mental heuristics involved in intuition are not aware of the fact that intuitions are not reliable in themselves, or that the result of an intuition *needs to be checked against a reliable measurement or observation* before it is used as though it were knowledge.

The most pervasive intuitive heuristic identified by Tversky and Kahneman (1973; 1974) is the *availability heuristic*. Since the function of intuition is to substitute for investigation and observation when conserving time and other resources, intuition assigns exaggerated likelihood and plausibility to the most readily available ideas, and reduces the subjective likelihood and plausibility of ideas that are less available and would require more time or a greater expenditure of resources to investigate and measure. Thus, an interpretation of the Big Bang singularity as a "creation," rather than as an instance of a

class of known singularities such as those in Black Holes (Cavaglia et al. 1995)—even though the latter interpretation requires fewer concepts—is most likely a result of the pervasive cultural availability of the Hebrew creation myth, and an example of the availability heuristic at work.

The most common intuitive bias is *confirmation bias*: intuition favors ideas one has already spent some time thinking about, rather than new ideas that would require additional time, and perhaps other resources, to investigate. To decide on the basis of objective evidence and conceptual razors, rather than from prior familiarity with one idea or another, requires constant awareness of one's susceptibility, along with all human minds, to confirmation bias—and awareness of the unreliability of intuition.

Some intuitive biases reflect the relative cost of different kinds of wrong decisions in the evolutionary context. One of those is *agency bias* (Gilbert et al. 2000): the preferential ascription of observations to animate agency. Consider a hominid who has noticed a depression in the soil, most likely a happenstance result of wind and rain, whose objective likelihood of having been made by the footprint of a predator or an enemy is fairly low—say around 10%. The cost of being wrong in interpreting this observation as a result of predator or enemy agency is perhaps a few minutes spent in hiding, or some stress from worry. However, the cost of being wrong, in the case when what the hominid noticed was actually due to predator or enemy agency, and was interpreted as happenstance, is sudden death and elimination from the gene pool. Our evolved intuitions are evolutionarily programmed to favor agency. But in the political context, the intuitive ascription of agency to what is actually happenstance leads to man-made disasters. Interpreting reality in terms of divine agency has given us crusades and other religious wars, inquisitions, suicide bombers, and faith-based impediments to a wide range of rational human action, from money-lending and sexual self-realization to free expression, abortion, pain relief and medical research. Interpreting reality in terms of human agency, embodied in imaginary enmities and conspiracies (Capitalist, Jewish, Kulak and so on) has given us gulags and democides.

Intuition may be a useful source of ideas that can be tested by objective measurement before one sends a design to production, or

tested by observations and experiments before one publishes a scientific result. Intuition can be useful when one smells smoke in the house, or when one needs to decide which theater to drive to before the last show on an evening when one's Internet connection is down. Yet even when it is useful to use intuition, a reasonable person will keep in mind the fact that her intuitions are distorted by biases and heuristics.¹² Even if one does one's best to allow and correct for the distortions of intuition by heuristics and biases, intuition cannot yield reliable knowledge. But the business of an intellectual, and especially of the philosopher, is to spend whatever time and resources are required to get to reliable knowledge. That means taking the time to investigate, observe, measure and integrate the facts of reality, and to track every idea to its source in the evidence of the senses. Intuition is a mental faculty that evolved to permit survival in situations in which our evolutionary ancestors did not have the resources to do these things. It is not a source of knowledge or a valid tool of inquiry. Reality is under no obligation to be intuitively plausible, and the intuitive plausibility or implausibility of an idea tells one nothing about its relation to reality. Intuition has no legitimate role in doing philosophy.

Summary

Ayn Rand's rejection of theism was based on Newton's principle that the scientist "should abstain from contemplating" (Thayer 1953, 6) propositions that are arbitrary in the sense of not being grounded in objective evidence. Parrish (2007) and Toner (2007) argue against Objectivism's rejection of theistic claims. Their arguments, however, are based on nothing but misuse of intuition, and indirect appeals to alleged evidence—which turns out to consist of middle-school fallacies, and of attempts to deduce a god from some temporary gap in scientific knowledge. Their arguments are, as Wolfgang Pauli said of earlier attempts to argue from arbitrary hypotheses, *not even false*.

Notes

1. Despite strong misgivings about the editorial policy of *The Journal of Ayn Rand Studies*, I decided to follow normal academic procedure and submit my comments to the journal where the target articles were published, and where academic readers will look for a response.

2. Reducing the number of concepts, rather than the number of entities, in

explaining evidence has been the working procedure of modern science at least since the time of Galileo, who was prosecuted, and punished with house arrest, for this innovation (Harriman 2007, 75–90). The atomic theory (Harriman 2006b) and the replacement of phlogiston theory with statistical thermodynamics, greatly increased the number of entities—atoms and molecules—needed to account for physical and chemical measurements, while simultaneously decreasing the number of necessary concepts.

3. While first-rank strikers in *Atlas Shrugged* include two professional philosophers, Hugh Akston and Ragnar Danneskjöld, Rand’s philosophical system is first described by a physicist.

4. The specific preconditions of contextual certainty with different types of measurement are beyond the scope of this article.

5. An example from Peikoff 1991.

6. Although some arguments for those notions may be—see the opening paragraph of this article.

7. According to Wikipedia.org, the term “God of the gaps” “goes back to Henry Drummond, a nineteenth century evangelical lecturer, from his Lowell Lectures on the Ascent of Man. He chastises those Christians who point to the things that science can not yet explain—“gaps which they will fill up with God”—and urges them to embrace all nature as God’s, because “an immanent God, which is the God of Evolution, is infinitely grander than the occasional wonder-worker, who is the God of an old theology.”

8. Zeilinger’s (1999) interpretation of quantum mechanics does not specify a physical layer, that is, it does not specify exactly how information is encoded and carried in the physical attributes of quantum particles and systems. While such a specification would be desirable for a fully realistic understanding of Zeilinger’s interpretation, there is nothing in it to prevent the eventual identification of its physical layer, and the lack of an already specified physical layer does not make Zeilinger’s interpretation of quantum mechanics unrealistic or subjective.

9. The sequence of assimilation followed by coevolution is sometimes called the Mullerian two-step process.

10. Alvin Plantinga is the John A. O’Brien Professor of Philosophy at the University of Notre Dame.

11. For a recent collection of survey articles on research about intuition—unavoidably incomplete, given the scope of this research since then—see Gilovich et al. 2002.

12. Even reasonable use of intuition, to make minor decisions that do not justify a deeper investigation, may distort future judgment and, if one is not careful, lead to after-the-fact rationalization of actions that were originally based on intuitions. Since the function of intuition is to permit decision-making when one is short of time, the heuristic is to treat all of one’s previous actions as justified. Intuitive rationalization of one’s prior actions and choices was originally studied under the rubric of cognitive dissonance (Festinger 1957).

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