

What is a skeptic? If you ask a skeptic you're likely to get an answer that involves science, rising tides of nonsense and debunking the paranormal. If you ask a UFOlogist, or a parapsychologist, you are likely to hear something about negative naysayers and closed minded critics.

In this article, I'm interested in how skeptics define themselves, and the accuracy of those definitions. Skeptics form a sub-culture in western society, and like all cultures they have their own core set of beliefs and mythology. It is those myths that interest me, as a skeptic.

The culture of skeptics has not completely escaped the notice of academics. David Hess wrote *Science in the New Age* after returning from field work in Brazil where he studied spirit mediums. In Brazil the parapsychologists were the skeptics, who used science and rational inquiry to study the paranormal. Hess was surprised to return to the US and find parapsychologists being described as credulous believers by the Committee for the Scientific Investigation of Claims of the Paranormal (CSICOP).¹

Science in New Age, however, deals only with the published writings of nationally organized skeptics, particularly CSICOP. More recently, Stephanie Hall has been studying skeptics in local groups. Not surprisingly, she has found some differences in the approach and core beliefs of people who join a local group, versus those who write for *Skeptical Inquirer*.²

When reading about skepticism as described by skeptics two attributes stand out: defending rationalism, and the application of science. So you may find skeptics described as: Defending science and reason against a rising tide of the irrationality; protecting an uninformed public who are misled and robbed of their health and hard earned money by unscrupulous charlatans and flimflam artists; Applying the scientific method to "debunk" claims of pseudo-science and the paranormal; And, turning the cold eye of reason on primitive superstitions and nonsense.

Science figures prominently in core skeptic beliefs, but it is a particularly skeptic-like definition of science that is found in most of their writings. For example, a skeptic might define science as: The best method for gaining objective knowledge; Or, as a self-correcting system that applies logic and empirical methods to test theories of nature against observable data. A skeptic may discuss the scientific method, and insist that to be a "scientific theory," a theory must be capable of being disproved. Theories that cannot be disproved are called non-scientific, or pseudoscience, or, relegated to belief systems.

These definitions embody a number of assumptions and myths of skepticism. Myths of epistemology, the philosophy of science, the nature of reality and the sociology and psychology of people who believe in the paranormal or in fringe science claims. A myth is a popular belief or tradition that has grown up around something or someone, embodying the ideas and institutions of a segment of society. Myths may be based on sound principles, or contain a kernel of truth, but they are meant more to convey a tradition or belief.

¹ Hess, D. *Science in the New Age: The Paranormal, Its Defenders and Debunkers, and American Culture*, University of Wisconsin Press, 1993

² Hall, Stephanie, "Folklore and the Rise of Moderation Among Organized Skeptics," *New Directions in Folklore*, forthcoming, January 2000.

The purpose of this article is to “debunk” some of these myths by pointing out the weakness of the simple versions of reality they describe. The goal is to provide guidelines for stronger, more robust and applicable versions of the same “ideas and institutions” embodied in the original myth. Self examination is good. This article is an attempt at examining some assumptions of skepticism.

Myths about Science and the Scientific Method.

Science is central to the questions of how we know what we know and don't know. If, as skeptics, we invoke science to understand nature it is important that we understand the strengths and weaknesses of science.³

Myth #1: Theories cannot be proved, they can only be disproved.

Corollary: If the data do not match the predictions, the theory should be abandoned.

Corollary: In this way we converge to the truth.

This is called “naïve falsification.” It, along with its corollaries, is a common myth among skeptics and one that should be put to rest.

Falsification is usually attributed to philosopher Karl Popper.⁴ Popper did indeed place a strong emphasis on falsification in his proscription for science, but he did not believe that this is the way scientists actually work. Instead, Popper proposed falsification as a way of eliminating mistakes. Some theories have little to say, and vulnerability is a scientific virtue. But, falsification is not the last (or even the first) word on what makes a good theory.

The logical basis of falsification is that theories have observational consequences—they predict Data. If theory T is true, and makes prediction D , then we should expect to see the data D . Otherwise T is false. Note, it is a logical fallacy to assume theory T from data D , since multiple theories predict the same data.

The problem with this model is that theories are never tested in isolation. Rather, they are tested in bundles that include the hypothesis of interest, theories of how the hypothesis maps to the real world, and auxiliary assumptions (other theories.) If D is not observed, a researcher is logically justified in maintaining belief in T by assuming the mapping or auxiliary hypothesis are wrong. The history of science is filled with now accepted theories that failed, or only marginally passed, initial tests. Newtonian physics, for example, failed to accurately predict the orbit of Saturn. Supporters of Newton at first assumed orbital measurements were inaccurate (they were). Later, as orbital measurement improved, an auxiliary hypothesis in the form of a conjectured new planet was introduced. This auxiliary hypothesis was tested, and found to be correct in what stands as one of the most spectacular predictions ever made by a scientific theory.

Newtonian physics, however, failed an important early prediction. It had clear, unambiguous, observational consequences and they were not observed. Under naïve

³ Since my original talk, *Skeptic* magazine has published an excellent article “Myths of Science” by William McComas *Skeptic*, 5(2), 888–95, 1997. McComas deals more with the misleading simplification of science used in education, while I deal more with the philosophical underpinning of science.

⁴ For example, Popper, K., *The logic of scientific discovery*, 1959.

falsification it would have been abandoned. Obviously, it wasn't, but not because it passed all tests or solved all outstanding problems. In fact, as Kuhn and others have pointed out Newtonian physics initially predicted less than some competing theories.⁵

In addition to rejecting theories which we accept as science, naïve falsification would accept theories that are without a doubt bad science. For example, a mystic gives his theory as: "Quietness is the wholeness in the center of stillness." This is his central theory, it is core to his view of the world.⁶

"But," you object, "the theory has no observational consequences, and hence cannot be refuted. It is not a scientific theory."

"Nonsense," replies the mystic. "There are plenty of observational consequences of my theory. For example, If quietness is the wholeness in the center of stillness, then flowers bloom in the spring, bees gather pollen, and narrow minded naysayers reject my theory. As you can see all of these observations are true, so my theory is not refuted."

What happens now? Since any statement can be tacked on as an observational consequence to any other statement there must be more to a good theory than having observational consequences. Some propose that a theory must have "strong" observational consequences. That is, nothing in particular attaches the mystic's consequences to his central theory. This, however, assumes that our views of causation, the seasons and evolution, are correct. We are, in short, applying our own auxiliary hypothesis to the mystic's theory. Why is this justified over him applying his own auxiliary hypothesis to our theories. In the end we are left flailing our arms and shouting "but, that's not a theory!" Well, it isn't but not because it can't be falsified.

Finally, there is a problem with the notion of converging to correct theory via a process of elimination. We only ever have a finite number of observations supporting any given theory. Newtonian mechanics may have a potentially infinite number of observational consequences, but, at any given time, we have only tested a finite number. As a result, there are a potentially infinite number of theories that can predict the same data set, and we cannot possibly eliminate them all in finite time.⁷ Since $\infty - N$ is still infinity we are not logically justified in claiming convergence.

Note however, that good theories have a large number of observational consequences, and repeated success builds confidence in theories while repeated failure erodes support. However, there are very few "critical" tests in the history of science. Certainly the best tests of a theory are recorded, written into the text books, and studied by future practitioners. But this creates the false sense of progress by critical tests and the elimination of competing theories. The reality is that during the time of discovery, when a theory is new, support is much less certain and results are often seen as less convincing by contemporary critics.

⁵ Kuhn, T. *Structure of Scientific Revolutions*, University of Chicago Press, 1976; Laudan, L. *Science and Relativism: Some Key Controversies in the Philosophy of Science*, University of Chicago Press, 1990; Kitcher, P. *Abusing Science: The Case Against Creationism*, The MIT Press, pp. 42–50, 1986.

⁶ The example is from Kitcher, 1986.

⁷ I leave this as an exercise to the reader.

Myth #2: Science is a self-correcting system.

Corollary: An integral part of this self-correcting system is the peer review process.

Open scrutiny by a critical community is an important part of science (perhaps the most important), and peer review is a vital part of this process. So this is not so much a myth, as warning against placing blind faith in peer review.

Consider this study by Michael Mahoney.⁸ He prepared two papers that were identical in methodology, but different in which theory the results supported. He sent these papers out for review by reviewers who had earlier expressed support for either the theory supported by the experimental results, or the theory refuted by the experimental results.

Mahoney found two things: First, reviewers were more likely to reject papers that did not support the theory they favored. Second, reviewers were on average more critical of the methodology in the papers that did not support their prior views—even though the methodologies were identical. That is, the reviewers in Mahoney’s study held conflicting theories to a higher standard.

Fortunately, peer reviewed journals are not the only outlet for scientific results. The usual response to having a paper rejected is to address the reviewers complaints, perhaps running additional experiments, and resubmit a new paper. If that doesn’t work, there are second tier journals, conference reports, book chapters, workshops, the Xerox machine and, increasingly, web pages. Some of the most influential scientific articles went through several rounds of rejections and revision before finding a publisher.

Peer review also begs the question of who are peers? Should a journal of UFO studies be reviewed by fellow UFOlogists? A parapsychology journal by parapsychologists? One could argue, based on Mahoney’s results, that for the best critical review, the reviewers should be strong critics of the supported theory. This would not be a workable system. It would be tantamount to not publishing until consensus is reached—a stifling practice if there ever was one.

Rather, the goal of peer review is to serve as minimal quality-control, and to weed our errors and improve arguments. Most of peer review’s effectiveness, however, comes before an article is submitted for publication. Scientists anticipate objections and arguments while designing experiments knowing that it will be examined, formally and informally, by their peers. But, peer review is not a silver bullet argument for validating a position. At the least, you must consider the community of reviewers.

Myth #3: The data speaks for itself.

This is the “just the facts Madame” view of science; the belief that scientist dispassionately seeks objective data, and lets the chips fall where they may. In fact, a charge frequently leveled at science by some of its more eccentric critics is that they are not willing to just ‘look at my data.’

The problem is data doesn’t speak for itself, and refuting this claim is the meat and potatoes of the school of philosophy known as cognitive relativism.⁹ We

⁸ Mahoney, M.J., Publication Prejudices: An experimental study of confirmatory bias in the peer review system. *Cognitive Therapy and Research*, 1, 1977, pp. 161–175.

⁹ The term postmodernist is frequently used instead of cognitive relativist. While postmodernist

decide what data to look for based on theory, we select our method of measurement based on theory, and we use theory to organize and present our data.

It is often said that seeing is believing, but believing is also, to an extent, seeing. It is much easier to find something if you know where to look, and good theories help us to look in the right place.¹⁰ Who, for example, would have looked for the top quark without a theory telling us it should be there.

I want to emphasize that despite what some cognitive relativist might claim, we do have reliable checks on theories. Some observations are more robust or “fact-like” than others. Some observations rely on well established theories (such as optics). Others depend on weaker theories (such as measures of aggression). It is important, however, to not throw the baby out with the bath water. Relativism should be viewed as a precaution to watch out for our own biases, use the best objective methods at our disposal, and be aware of when our data is subject to interpretation.¹¹

Myth #4: Extraordinary hypothesis require extraordinary evidence.

This is a myth that, as myths go, isn’t all that bad. All things being equal, a more extraordinary claim, a claim that makes predictions which contradict those of well established theories, does require better evidence. But, all things are usually not equal, and a skeptic would do well to gain a better understanding of the assumptions behind this slogan. Theodore Schick wrote an good article about this for Skeptic. I will review some of his criticisms and toss in one or two of my own.¹²

The biggest problem with this myth is it favors conservatism, or retaining the established theory. This is both good and bad. We should retain that which works until something better comes along. But, new theories require time to develop, to be tested, to prove themselves against the old theories. If scientists do not study new theories, and if funding is not made available to run experiments, new theories would not be able to accumulate extraordinary evidence. When this happens, science cannot progress. Clearly, some guidelines are needed to for when a competing theory is promising enough to warrant further research before extraordinary evidence is available.

Some guidelines to consider are: the scope of a theory, or how much data, relative to another theory, the new theory account for; the fruitfulness of the new—how many new ideas does it generate; the number of assumptions for the new versus old theory. There is a tendency to favor theories that make surprising results, and there are also trendy theories which attract research because they are new and interesting compared to established theories.

may draw on the theories of cognitive relativism the two are not the same. Specifically, the views of postmodernist draw more from literature and art movements, while cognitive relativists are philosophers of science, and likely as perplexed by postmodernism as the rest of us.

¹⁰ One is reminded of the drunk who upon loosing his keys by the stairwell proceeds to look for them under a street lamp “because the light is better over here.”

¹¹ See, for example, Faust, D. *The Limits of Scientific Reasoning*, University of Minnesota Press, 1984 for one example of how knowledge of cognitive limitations can lead to more objective science, and Kitcher, P. *The Advancement of Science: Science Without Legend, Objectivity Without Illusions*, Oxford University Press, 1993 for a realist construction of science which incorporates the stronger cognitive relativism arguments.

¹² Schick, T. Jr., Do Extraordinary Claims Require Extraordinary Evidence? A reappraisal of a Classic Skeptic Axiom, *Skeptic*, 3(2), 1995, p. 30–33.

Finally, what is the price if we are wrong? If a well established theory is accepted on less than extraordinary evidence what harm will come in the form of redirected research efforts, or the impact on society. If the harm is minimal, a new competing theory is more likely to be considered.

Schick summarized; the myth does not give a sufficient condition for sufficient evidence. In practice, it is usually better to avoid saying “Extraordinary claims require extraordinary evidence” in specific arguments—it is not a *fait accompli*. Instead, ask what evidence the claimant has, or suggest what is lacking in the evidence presented and what would be more convincing evidence. Take the time to explain what well established theories are being contradicted. This doesn’t always help, but it usually doesn’t hurt.

Myth #5: There is one universal scientific method.

Reference is often made to “The Scientific Method” as though it were one, well established, universal problem solving tool. The truth is, we do not have a good description of what scientist actually do, and we are not even close to universally prescriptions for what they should be doing. Instead of a universal method we have a collections of techniques, rules of thumb, and methodologies. Different fields of science place different emphasis on theory versus data, controlled experiments versus observations, prediction versus description, and so on. Some sciences have theories so well established that a researcher is justified in throwing out experimental results. Others rely on statistical samples and general trends.

Henry Bauer discusses the various methods of science, and how disciplines differ based on the quality of data, area of study, level of maturity and so on. He applies a model of open review, sharing of findings, and filtering of theories to abstract a more general model of what the sciences have in common.¹³

Others have suggested rules of thumb for good and bad theories (e.g. Laudén, 1990; Kitcher, 1982; and Schick, 1995). But rules of thumb and open review do not define an algorithm guaranteed to provide success. Instead, they are part of the methods scientist in different disciplines use to evaluate theories, based on the criterion of their individual fields of study, and the research difficulties they face.

Myth #6: Science is our best method of acquiring knowledge.

Is science our best method of acquiring knowledge? Well, it depends on what kind of knowledge you are trying to acquire. Usually, when invoking this myth, skeptics do have some specific scientific, or quasi-scientific, knowledge in mind. For example, science can be applied towards knowing if thoughts are being transmitted by a paranormal means. Used this way, the myth is fine, if tautological—in the area of scientific inquiry, scientific methods are best. But skeptics frequently engage in what is called scientism, or the elevation of science to a belief system by giving it primacy in all areas of understanding, or only accepting science in intellectual arguments (dismissing the arts, politics, culture, religion, etc.), or reducing or recasting all problems as scientific problems.¹⁴

¹³ Bauer, Henry *Scientific Literacy and the Myth of the Scientific Method*, University of Illinois Press, year = 1994

¹⁴ See the entry for *scientism* in *The Oxford Companion to Philosophy*, Honderich, T., ed., Oxford University Press, 1995.

When doing so, skeptics dismiss claims based on personal experience, or from established norms or based on religious belief. This is fine if the claim being discussed is scientific, if the realm of inquiry is in the sciences, or a reasonable extension. But, often skeptics argue with people who have not accepted the arena of science, resulting in two parties who argue past each other. My neighbor may believe she saw a ghost as a child. It is a personal, salient experience that has affected her life. I could present scientific arguments for what might have actually happened, perhaps to explain why despite her testimony I'm still skeptical of ghosts. But other than to explain the basis of my own belief (or non-belief) what would be the point? To people, personal experience can be very convincing, and serves as the empirical evidence use to justify beliefs.

In addition, there are many important, practical problems that affect us everyday for which the exacting, demanding and specific requirements of science are difficult or impossible to apply. Science may help frame problems, provide answers about the effect of a policy, etc. But we are usually left making decisions without full knowledge.

Usually, instead of science the skeptic means “rational inquiry,” or applying the normally understood rules of cause-and-effect, logic, sound principles of reasoning, problem solving skills, and so on. But, how often does our opponent in debate abandon rational inquiry? We may disagree with the assumptions and theories being applied—insisting they are not rational, but usually the assumptions and theories are being applied using the normal rules of rational inquiry, which are much less exacting than those of science.

Myths of Problem Solving and Decision Making.

Skeptics are usually more aware than the general public about studies showing the fallibility of human reasoning, problem solving, and memory, They are usually less aware of studies showing the same reasoning problems among scientist, and some act as though they themselves were somehow immune to these limitations.

Myth #7: Scientist are more intelligent than average, and better than average problem solvers.

Corollary: Scientists in the “hard” sciences such as physics are smarter than those in the “soft” social sciences.

The reality is somewhat different. Scientist are first and foremost human beings, and human beings are not very good at decision making when given complex tasks—even with training. In fact, many of the methods of science are designed to take the decision making power away from humans and instead use objective—if limited—mechanical methods.

When studies of intelligence and problem solving do use scientists as subjects, the results are roughly the same as the general population. High intelligence is no more common in science than in other fields.¹⁵ This is not surprising since it takes intelligence to be a good investment banker, doctor, politician, machinist, and so on. Further, science doesn't always pay well, and there are limited openings so one could argue it is smarter to not be a scientist.

¹⁵ Roe, A., *The making of a scientist*, Dodd, Mead, NY, 1953.

Mahoney and Kimper found that many scientist do not comprehend basic principles of logic underlying the scientific method.¹⁶ Mahoney and DeMonbreun found that scientist predominately use confirmatory strategies.¹⁷ In this study members of the clergy used disconfirmatory strategies more often than scientist, although it was rare in both groups. Think about this for a second. According to the standard Popperian view, refutation is what scientist should strive for. According to rules of reasoning as we understand them, refutation is a powerful strategy for ruling out hypothesis that are wrong. And yet, scientist do not apply it in logic problems?¹⁸

As for hard versus soft science, it depends on the question being asked. Lehman, Lempert & Nisbett found that psychology and medical graduate students are better than chemistry and law students at problems that tested statistical and methodological reasoning.¹⁹ This is not surprising. In General expertise is narrow; an expert knows a lot about a little. Once outside of their domain of expertise experts' performance drops to normal. Multivariate designs using statistical reasoning are within the psychologist's domain of expertise. Such findings also explain why psychologist are much less likely to believe in ESP compared to other college professors.²⁰

Myth #8: People may not be perfect with reasoning, but training in the use of formal methods of reasoning, and particularly knowledge of science improves that reasoning.

There are many demonstrations that even when the expert does have the domain knowledge, they do not always apply it in everyday reasoning, or even in all professional settings where it is applicable. For example, clinicians do not take baseline rate into account when making diagnosis.²¹ Not surprising, most people don't either.²²

In addition, simple statistical diagnostic methods outperform people in medical and psychiatric diagnosis;²³ Statisticians over-estimate probability of a result

¹⁶ Mahoney, M.J. & Kimper, T.P., From ethics to logic: A survey of scientists. In *Scientist as Subject*, by M.J. Mahoney. Ballinger, Cambridge, MA, 1976.

¹⁷ Mahoney, M.J. & DeMonbreun, B.G., Psychology of the scientist: An analysis of problem-solving bias. *Cognitive Therapy and Research*, 1, 1977, pp. 229–238.

¹⁸ There is, in fact, a long literature studying people's inability to solve logic problems involving refutation. A review of much of this research is in Johnson-Laird, P.N. & Wason, P.C., eds., *Thinking: Readings in Cognitive Science*, Cambridge University Press, 1983.

¹⁹ Lehman, D.R., Lempert, R.O. & Nisbett, R.E., The effects of graduate training on reasoning: Formal discipline and thinking about everyday-life events. *American Psychologist*, 43, 1988, pp. 431–442.

²⁰ Wagner, M.W. & Monnet, M., Attitude of College Professors Towards Extra-Sensory Perception, *Zetetic Scholar*, 5, 1979, pp. 7–16. Padgett, V.R., Benassi, V.A. & Singer, B., Belief in ESP Among Psychologist. In Frazier, K. (ed.), *Paranormal Borderlands of Science*, 1981, pp. 66–67.

²¹ Meehl, P.E. & Rosen, A. Antecedent probability and the efficiency of psychometric signs, patterns, or cutting scores. *Psychological Bulletin*, 52, 1955, pp. 194–216.

²² Gilovich, pp. 106–111. Paulos, J.A., Health Statistics May be Bad for Our Mental Health, *Skeptical Inquirer*, 20(1), 1996, pp. 41–44.

²³ Meehl, P.E., Clinical versus statistical prediction: A theoretical analysis and review of the evidence., Minneapolis, University of Minnesota Press, 1954.

based on a small sample holding up in a large sample;²⁴ And many others showing illusionary correlation due to confirmatory bias, and so on.²⁵

In short, science works despite the people, not because of it. It works because of open review (to catch errors) with an emphasis on simple formal methods—not as replacements to informal methods, but as a supplement to them. Science studies difficult problems, and there are cognitive limits to what humans (even scientist) can do.

Myth #9: Skepticism makes one less vulnerable to errors of reasoning or illogic.

Anybody who reads *sci.skeptic* or other online forums will quickly disabuse themselves of this belief. There are many “hot button” issues such as global warming, population, economic systems, atheism vs. agnosticism, etc. which result in seemingly pointless debate far removed from the data. Many issues are complex and the data is subject to interpretation. My own informal observation is that skeptics, *qua* skeptics are no more rational than the average person. But, many skeptics (especially those online) are scientists and they do have expertise in particular fields. It doesn’t follow (see above) that their knowledge and reasoning skills are better than the typical expert in the same field. Skeptics are also amateur experts in various fringe claims, and so have specific domain knowledge to contribute.

Occasionally you will find people who claim to be more rational because they are skeptics, pure and simple. For example, we once had a member of ISUNY (The Inquiring Skeptics of Upper New York) who is about as skeptical as they come. He is an atheist, and believes that you cannot be a true skeptic without being an atheist (see below). He would tell stories of challenging a dowser double or nothing to divert water from his basement. He took community college classes just to hassle the instructors. He and his wife showed up at our second meeting wearing “number one skeptic” and “number two skeptic” badges. He also believes the holocaust is a myth created by a Zionists conspiracy, and perpetuated by the state of Israel for the purpose of extorting money from the German government. He eventually quite ISUNY—I guess we were not skeptical enough for him.

Myths about Belief Systems.

Skeptics often express opinions about those who “believe.” How accurate, how scientific, are these opinions?

Myth #10: Believers in the paranormal are thinking in primitive, childish, misguided and uninformed ways.

People who hold a paranormal or non-empirical belief may simply be expressing a cultural, personal or spiritual view, and nothing more. This does not mean they are less intelligent, more primitive, childish or irrational. They are capable of applying

²⁴ Tversky, A. & Kahneman, D., Belief in the law of small numbers. *Psychological Bulletin*, 76, pp. 105-110, 1971.

²⁵ For example, Chapman, L.J & Chapman, J.P. Genesis of popular but erroneous psychodiagnostic observations. *Journal of Abnormal Psychology*, 72, 193–204, 1967. Chapman, J.P., Illusory correlation as an obstacle to the use of valid psychodiagnostic signs. *Journal of Abnormal Psychology*, 74, 271–280, 1969. Mitroff, I. *The subjective side of science*, Amsterdam, Elsevier Scientific Publishing, 1974.

rational and intelligent thought to a wide variety of everyday situations—when it matters, and no doubt do this without a second thought.

Personal, pre-scientific beliefs may be closer to folk-theories in that they make use of the rules of sympathetic magic, naive empiricism and folk-psychology, but the attitude expressed by these myths is simplistic, antagonistic and condescending. At best it is bad science, at the worst it is self-defeating to a professed goal of skeptics—to educate and inform the public.

Finally, belief systems, who believes what, and how beliefs correlate with intelligence or education level can and have been studied empirically. The results are inconclusive—there are intelligent and well educated believers, and less intelligent and uneducated atheists. In the United States, for example, the rapid growth in alternative medicine is largely a well educated middleclass phenomena.²⁶

Myth #11: Believers in the paranormal don't want to give up their comfortable belief system. They are afraid to think independently and need the security blanket that all such belief systems provide.

Corollary: Promoters of the paranormal are manipulative and un-ethical charlatans. These flimflam artists take advantage of people's "need to believe" to bilk them of their money and health.

These myths are suspect. What is so comforting about the belief in eternal damnation for unethical behavior? What is comforting about a religion which encourages self-sacrifice for the benefit of others? How are "New Age" environmental beliefs a security blanket? To the contrary, a blind faith in the ability of science and technology to solve all problems can be a comfortable security blanket.

Also, while it may be true of some promoters in the paranormal are in it only for the profit, this is in no way an accurate characterization of, for example, chiropractors or naturopaths. Many practitioners and promoters of alternative medicine or spiritual beliefs act out of concern and compassion.

Myth #12: Failure to accept the findings of science, or a general tendency to believe in paranormal or fringe claims is a sign of intellectual weakness, mental illness or sloppy thinking.

If you want people to accept the scientific method when evaluating claims, you have to understand why they hold their beliefs in the first place. For example, Taylor, Eve and Harrold found evidence of two different reasons for belief among Creationists and New Age followers. The latter is associated with rejection of traditional religion and science. That is, a rejection of authorities. As scientists, skeptics, humanists, and agnostics—who also at times reject traditional authorities—can we pause, and ask ourselves at which point rejection of authority becomes a pathology?²⁷

Regarding the mental health of believers, much has been made lately of Fantasy Prone Personality (FPP) as an "explanation" of alien abductions.²⁸ The prob-

²⁶ see Hess, D. *Evaluating Alternative Cancer Therapies: A Guide to the Science and Politics of an Emerging Medical Field*, Rutgers University Press, 1999.

²⁷ Taylor, J.H., Eve, R.A. & Harrold, F.B., Why creationist Don't go to Psychic Fairs: Differential Sources of Pseudoscientific Beliefs, *Skeptical Inquirer*, 19(6), 1995.

²⁸ Baker, Robert A. 1987-1988. The aliens among us: Hypnotic regression revisited. *Skeptical*

lem is, the data is tenuous and the interpretation suspect. Spanos, et.al, for example, found that among UFO abductees those who meet the criterion of a FPPs told more vivid stories. The rate of FPP among abductees, however, was no higher than in the population at large.²⁹ This has not stopped some, however, from promoting FPP as a catchall explanation of this complex social and psychological phenomena.³⁰

Myths about Skeptics.

Finally, there are myths that skeptics hold about themselves, what they believe, and what skeptics do or should do.

Myth #13: Just show me the data and I'll believe it.

The problem with this is that skeptics are very often “shown the data” and very often don't believe it. Instead, they unpack the studies and look for the errors. This is known as doing good science. When a result contradicts accepted theory, or a fundamental assumption of natural science a good researcher, a good skeptic, will give it more than glancing attention.

For example, the PEAR or auto-ganzfeld results are by any stretch of the imagination extraordinary evidence. They are large meta-studies incorporating hundreds of separate experiments. They are the “proof” of psi-effects for skeptics, and everybody else to see. I have read those studies and remain unconvinced. I would be convinced, however, by the same level of data for a variety of other effects. In what way has PEAR not met its burden of proof?³¹ I remain unconvinced because of what I consider procedural and statistical problems with the meta-studies, or the collection of experiments that make up the meta-studies. I also remain unconvinced because I cannot see what belief would provide me? What theory drives the belief in psi? How will it help bring together other data, or generate new ideas? What phenomena (besides these meta-studies) would be explained by the psi-hypothesis?

Prior beliefs affect our acceptance of the data, and it could be argued that skeptics such as Gardner, Klass and Nickell are good skeptics **because** of their prior beliefs. They know going into an investigation that there is a prosaic explanation, and are determined to find it. What's wrong with that? Well, it can (and has in some cases) lead to incorrect or premature conclusions.³² It also doesn't do much for skepticism's reputation when a researcher goes in falsely, and obviously so,

Inquirer 12(2) (Winter): pp. 147-162. Wilson, Sheryl C., and Theodore X. Barber. 1983. The fantasy-prone personality: Implications for understanding imagery, hypnosis, and parapsychological phenomena. In *Imagery, Current Theory, Research and Application*, ed. by Anees A. Sheikh, New York: Wiley, pp. 340-390.

²⁹ Spanos, Nicholas P., Patricia A. Cross, Kirby Dickson, and Susan C. DuBreuil. 1993. Close encounters: An examination of UFO experiences. *Journal of Abnormal Psychology* 102(4): 624-632.

³⁰ Nickel, Joe., 1986, A Study of Fantasy Proneness in the Thirteen Cases of Alleged Encounters in John Mack's Abduction, *Skeptical Inquirer*, 20(3). This study suffers from massive selection effects in both the subject population and the application of FPP criterion. It also commits the logical fallacy of reverse implication. At best it is a suggestive observation, but it is so at odds with better controlled studies it is unlikely it could pass peer review.

³¹ Rabin & Nelson, *Foundations of Physics*, 19(12), 1989. Bem & Honorton, *Psychological Bulletin*, 115(1), 1994.

³² Kammann, Richard., The True Disbelievers: mars Effect Drives Skeptics to Irrationality (Part I & II), *Zetetic Scholar*, 10, pp. 50-62, December, 1982 Chronicles one case early in CSICOP's history.

proclaiming neutrality. Why not just be honest and say: “I don’t believe it. It is possible to convince me, but I don’t think that is going to happen because in my experience, the world doesn’t work that way.”

Myth #14: A skeptic should also be an atheist, or at least agnostic, since belief in a deity is incompatible with the truly skeptical mind.

We at ISUNY hear this a lot, and, from what I’ve heard we are not alone. First, to be honest many self-described skeptics are agnostic.³³ But, not all, or even a majority, of the members of local skeptical groups are agnostic, and there is a very strong commitment on the part of local groups to not exclude or alienate religious people.³⁴

As to whether being an atheist is a necessary precursor to being a true skeptic, I have already provided one counter example (the skeptical atheist who is also a holocaust revisionist). So clearly, being an atheist does not make one a good skeptic, why should being a good skeptic make one an atheist? There are a variety of attitudes and opinions regarding matters of personal faith expressed in the skeptical community. There are also a variety of ways people reconcile their faiths with science, society and politics. We should no more expect skeptics to be atheist than republican, or libertarian, or whatever your favorite “rational” political stance is.

We should also not underestimate theism as a motivator for a skeptical attitude. Bainbridge and Stark, for example, found a strong tendency for fundamentalist to reject occult and pseudoscience beliefs.³⁵ And, the claims of Mike Wernke that he was in a satanic cult were “debunked” by Hertenstein and Trott for Cornerstone magazine—an evangelical publication.³⁶ Mainstream religions are also natural allies with skeptics in opposing creationist attempts to teach their brand of religion in science class.

Besides, issues of gods and dæmons are none of the business of a skeptics group for good, practical reasons. And, there is nothing more frustrating to those who work hard to build a local skeptics group than to have atheists come in and drive away members by attempting to convert them.

Myth #15: Being a good skeptic means being a debunker.

Some people are really gun-ho to debunk. Why? I can understand a desire to “protect” people from charlatans, but that characterization of believers, and promoters of the paranormal is, to me suspect. It is also a very aggressive approach to skepticism, very confrontational, and makes many people uncomfortable. (And is, perhaps one of the reason there are so few women in skeptics organizations.)

³³ A poll taken by *Skeptic* magazine found that 31% of their readership professed strong atheism, 18.5% weak atheism, and 21.3% agnosticism. This is, however, a highly self-selected sample. That is, these people are self-identified skeptics, who read a humanist magazine.

³⁴ This sentiment was nearly unanimous at a gathering of East Coast skeptic leaders in Buffalo. Emotions ran strong during the discussion as it was repeatedly emphasized to attendant humanist that skeptics are not humanists, and take no stand regarding matters of faith. Rebecca Long of the Georgia Skeptics found that three out of 109 members thought humanism and skepticism were the same thing.

³⁵ Bainbridge, W.S. & Stark, R. Superstitions: Old and New., In Frazier, K., *Paranormal Borderlands of Science*, Prometheus, Buffalo, NY, 1981.

³⁶ Hertenstein, M. & Trott, J., *Selling Satan: The Tragic History of Mike Wernke*, Cornerstone Press, Chicago, IL. 1993.

If there is good evidence of fraud, there are law enforcement and regulatory agencies to handle this. If they are not doing their job to your satisfaction, there is a government open to lobbying and elections. Skeptic organizations can promote science and rationalism in a variety of ways that don't involve personal debunking efforts.

Myth #16: Skeptics are defending science and reason from a rising tide of irrationality.

Corollary: There is a rising tide of irrationality.

This is one of my favorites. It is in almost every CSICOP fundraising requests, it is repeated in *Skeptical Inquirer*, and taken as something of a matter of faith. And, faith is what it is, because so far I can find no evidence of an increase in irrationality or superstition. Next time somebody mentions this “rising tide,” ask him or her when irrationality was at it's low point and what life was like in those halcyon days. Or, ask how they are measuring irrationality and it's increase. Even the polls published over the years in *Skeptical Inquirer* indicate at most a shift in emphasis as one belief replaces another in the popular imagination.

On the whole I suspect that irrationality, belief, and credulity are at about the same level as they have always been, just distributed in different ways. I further suspect that the terms used to describe the beliefs of others have more to do with how new versus established that belief is in society. When skeptics attack the New Age *qua* New Age, I always have this uncomfortable feeling that New Age beliefs are being singled out. Somebody makes a testable claim? Ok, test it. Somebody professes belief in a oneness of life? Let them get on with their life, and find another hobby for yourself.

Where are We Now?

Where are we? What is skepticism and what is science? I hope that I've convinced you they are not what was characterized in the opening descriptions. But, it would be nice to have some definitions to put in their place. Some description we can offer our grandparents when they ask about our hobby.

Personally, I would describe skepticism thus:

Skeptics attempt to understand the aims, methods, values and claims of belief systems. They apply critical reasoning methods, including but not limited to the methods of science, to the paranormal; to fringe-science; and to the fashions of society. They also investigate those claims from mainstream science that are most subject to researcher bias, and which affect, or are affected by the views of society at large.

Skeptics promote the understanding of science—both its methods and conclusions. More importantly, however, they promote the idea that formal and critical reasoning methods can be fruitfully applied to a wide range of phenomena, and can contribute in a positive way to public debate. It is more important, from the view of a skeptic, that an argument be well reasoned and claims critically evaluated, then that the conclusions and beliefs people hold are in accord with that of the skeptic, or those of science or society.

I think that this view would be shared by many readers of *Skeptical Inquirer* and *Skeptic*, although maybe not the majority. It is also a view that many non-organized skeptics would likely agree to.

Science is still central in this description and it was the simplistic view of science and the scientific method that I spent more time debunking. What replaces it? A definition that would be in accord with what is often referred to as the pragmatist school of philosophy might go something like:

Science is the application of formal and informal reasoning methods to understand and predict the natural and artificial worlds in which humans live. Central to science is a belief that the natural world is ordered; that it can be understood; and that it can be explained via natural processes without resorting to special causes, or the interventions of the supernatural. Science also places a very high priority on what can be observed and measured. The theories of science should be fruitful, inclusive, simple, and, to the degree possible, independently tested.

Science is first and foremost, however, a human activity. As such, its methods and conclusions are subject to the psychological, sociological, historical, religious and political assumptions of the individual and collective scientists. This does not invalidate science or its conclusions, but it does mean that scientist must apply the same formal methods to their own reasoning that they apply to the object of study. It is incumbent upon ethical scientists to make their own biases known when requesting research support, and when announcing the conclusions of that research.

This is in accord with my own view of science. It is the view implicit in many post-Kuhnian writings on the history and philosophy of science. I do not claim that all philosophers or historians of science would agree with it. You can no more get a group of philosophers to agree on what science is then you can get a group of scientist to agree on what science is.

These passages, however, are much less certain than those they replace. They are in some way, quite frankly, less satisfactory. It seems to me that skeptics and scientist, like everybody else, would like to have some certainty in their world views. They want some area that they can grasp onto and find comfort in, and to a degree what I've done is take some of that away, or at least show that the picture is not so clear as you might have assumed.

I believe that in the long run, however, these definitions are better. The questions raised by the relativist are good. I don't agree with their answer, but science and society is not as simple as the view expressed by relativism's critics. There is unlikely to be a simple and effective method of knowing the truthfulness of any given claim, but we do have a multitude of criteria to apply, and a collection of simple and complex tools that can help us evaluate claims. We should use them.