"Ignorance Of Science Allows It To Be Distorted For A Cause"

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It is all but certain during the coming year that news of science will upstage even those most gruesome dramas of war and politics. Especially from the scientific fields of biotechnology and high-energy physics the recent and amazing spate of pioneering advances will flow onward, as the secrets of the stem cell are further unlocked and the puzzles of the universe's smallest particles begin to be solved.

It is also all but certain that science and scientific evidence will persist in being distorted, even suppressed, to suit the ideological, theological, and political ends of those for whom scientific knowledge fits poorly into their natural or supernatural views. While deeply troublesome, Americans should be worried more as 21st century citizens by our worsening public ignorance of science and scientific inquiry, ignorance that allows such distortion and suppression to go on largely unnoticed.

Excusably few understand science fully, or even partially. Our national emphasis on scientific education has for decades woefully lagged behind that of many fellow so-called advanced nations. Moreover, the nonscientist cannot help but misunderstand scientific terms by and large misused by our sound-bite screen media. By preying on this lack of public and media knowledge about the workings of science, those with decidedly unscientific religious and political agendas have at times been successful at perverting science to the cause of their false arguments.

The pious and the powerful find little need, however, to willfully distort scientific knowledge when society as a whole joins them in ignoring information that countervails not only religious and political aims, but individual material desires as well. Witness the past decade of persistent though diminishing denial by many of global climate change, despite that the role of humans in global warming has been established scientifically with about the same degree of certainty as the role of alcohol in drunk driving.

Such discarding and disregarding of data is opposite what occurs in science. Should a scientist discard or disregard data, other scientists will quickly reassert its existence. In the wide-open world of science, there can be no agenda-driven conspiracies. This dynamic, self-correcting nature is what makes science the most honest of human endeavors.

What is science? In the broadest and most poetic sense, science (from the Latin *scrire*, "to know") represents humanity's best efforts to know what is true about our world and our universe. By understanding the stars above us and the earth beneath we better understand who we are and our place in the world. The awe, perspective, and perhaps even serenity derived from such understanding can be invaluable to many, religious and nonreligious alike.

In the driest and most scientific sense, science refers to a system of acquiring knowledge based on the scientific method. With disproof at its heart, and self-correction as its guiding principle, science works and advances by asking, observing, hypothesizing, measuring, testing, retesting, rejecting or modifying concepts, and generating new data and concepts that are further tested.

Science is not a democracy. It is not a popularity contest. It is a merciless arena where ideas are thrown to the lions of the scientific method, to be attacked, picked apart, and tested time and again to see if they can still stand up to scrutiny. Those that can live on to fight another day; those that can not are dragged off and dumped in the nearest ditch.

Science thereby constantly strives to find the best explanation, or *theory*, that fits the most robustly replicated and validated data. When done right, science characterizes the world as it is, without regard to whose feelings might get hurt. It is the first to give up on an idea if it is proved wrong, for science is not in the business of knowingly holding on to wrong ideas.

What is science not? Science is not Art; it isn't technology. It isn't Truth, and it's not certainty. And it certainly isn't Religion, or a religion. And contrary to the simplistic notions of a modern media that thrives on conflict, pitting science versus religion, white coats versus black robes, science does not set out to conflict with or displace religious beliefs. Science cannot and does not aim to prove, disprove, or silence God.

Driven to research usually by simple curiosity and by the satisfaction derived from understanding even some small part of the universe, scientists labor to probe all things living and nonliving, earthly and extraterrestrial, to collect facts that when added to others might help humanity continue to overcome its ignorance, fears, and superstitions.

For there is everything to gain and nothing to lose by knowing the most we can possibly know. Not knowing makes the world large and uncertain, and creates anxieties that can either spur creativity and curiosity, or further our susceptibility to magical thinking.

That is not to say that science can know it all. It can not. Like reaching the horizon, arrival merely necessitates more travel. Scientific inquiry opens up just as many mysteries as it closes.

It is frankly not the goal of science to answer all questions, rather only those that pertain to perceived reality. Science, for instance, cannot answer questions relating to the supernatural, since the supernatural can neither be measured, quantified, tested, verified, nor falsified.

Science is ill-suited as well to address the existential longings and anxieties of humanity. It cannot tell us what we ought to do, only what we can do. Definitions of hope and meaning are missing in science, and for many people religion is what fills that void.

Science does not and can not produce absolute and unquestionable truth. Understanding is understood as simply the best fit to the data under current instrumental and philosophical limits of thinking. A scientific theory is merely a way of organizing tested and retested ideas to describe the behavior or natural phenomena.

But scientific theories are not the same of "hunches" or "gut feelings", which is the context in which the nonscientist uses the word theory. Scientists place a much higher standard on this word. To them, a theory is a powerful statement about the workings of nature, a strong explanation that ties together many reproducible facts from many different sources into an overall, unifying concept.

A scientific theory is always open to falsification, if new evidence is presented. Theories *should* change, as new discoveries are made, which is exactly the progress toward better understanding that science seeks. But to say "scientific theory" is not to imply "scientific uncertainty", a clever term employed by religious and political operatives to cast doubt in the public mind when a scientific theory challenges a traditional manner of thinking.

Too often the public sees science only after it passes through the prism of politics, despite that science is by its very nature apolitical. But those who would attack science or pervert it for

political gain or religious perseverance are organized, persistent, and well-financed. When sensible people stand idly on the sidelines, a great deal of nonsense is subsequently spread.

And when scientists, as is their wont, counter public ignorance and misinformation about science with science-intensive language, neither the public nor the cause of science is helped. Much of the public cannot help but tune out such technical messages.

We must nevertheless pay attention when science has something to tell us. It is difficult to imagine any aspect of public life where ignorance or delusion is better than an awareness of truth, even an unpleasant one. As that most famous of all modern scientists, Albert Einstein, once counseled, “You must learn to distinguish between what is true, and what is real.”