

GETTING IT RIGHT

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The banquet speaker for a conference I attended on the theory of relativity was a seminary professor whose topic was “Relativity and Liberal Religion.” In liberal religion, he said, as in Einstein’s theory, there are no absolutes. Everything is relative.

He had some interesting ideas, but there was a problem, which I and a few other less gentle physicists pointed out. In Einstein’s theory, everything isn’t relative. There are absolutes. It was an embarrassing but, I hope, instructive evening for the theologian.

Dialogue between science and theology is necessary if the church is to carry out its mission in today’s world. But genuine dialogue won’t take place if Christians have erroneous ideas about science, and it’s easy for that to happen when misunderstandings abound in popular culture. The problem is made worse by proponents of “New Age” thought who use terms like “energy” and “fields” carelessly. Errors like “everything is relative” make scientists think that theologians don’t know what they’re talking about, and fear of such mistakes may make preachers afraid to say anything at all about issues raised by science.

Here I’ll try to clear up a few prevalent confusions and popular errors that have had some influence on religious thinking. Of course, scientists also may have mistaken ideas about theology, but that isn’t our concern now.

Relativity, Not Relativism

The notion that Einstein showed everything in physics to be relative has provided an excuse for relativism in theology, morals, art, politics, and other areas. But Einstein didn’t show that.

All motion is relative: There is no absolute state of rest. But Einstein’s basic idea was that all the laws of physics must have the same form for all observers, regardless of their motions or coordinate systems. Those laws are in an important sense absolute. Observers moving with respect to one another obtain different values for measurements of spatial lengths, time intervals, and many other variables, so those quantities must be specified relative to one observer or another. But some quantities are the same for all. In particular, one of Einstein’s basic postulates is that the speed of light in vacuum is the same for all observers. It is absolute, not relative.

You could complain that the term “theory of relativity” is misleading, and some “relativists” would agree. But established terminology isn’t easily changed, and

understanding of a field requires more than acquaintance with its jargon. Theological terms can also confuse nonspecialists: Who would have guessed that a “theology of glory” was bad?

Chaos, Not Lawlessness

There is a similar problem with “chaos theory.” “Chaos” suggests lawlessness, and the fact that in some cases the chaos theory of physics describes the emergence of certain kinds of order has motivated some theological reflection.

That’s good, but care is needed. Chaos theory isn’t about lawlessness. There are laws that describe the phenomena in question (such as some fluid motions), but in many cases these phenomena display “sensitivity to initial conditions.” Two systems that start out in nearly the same state can develop in very different ways, and the impossibility of prescribing the initial state precisely means that the temporal development of a single system cannot be predicted. (The “butterfly effect” is a popular illustration.) This has theological significance when we try to understand how God can act freely in the world through natural processes, but it is not “chaos” in the popular sense.

The systems that display chaotic behavior generally obey nonlinear equations of motion. Linear differential equations are those for which the sum of two solutions is also a solution, while this is not the case for nonlinear ones. Unfortunately, some people have equated linear in this sense with so-called linear thinking and have connected it with old-fashioned, mechanistic, patriarchal, Newtonian, and other unpopular ideas, but the connections are largely imaginary.

(Pejorative use of the term “Newtonian” by supposedly advanced thinkers is a sure sign of dilettantism. For all the limitations of Newtonian physics of which we are now aware, no serious scientist would disparage the work of Newton, whose equations for planetary motion are nonlinear.)

Popular Misconceptions

Quantum theory’s reputation for weirdness also has encouraged some misconceptions. In quantum mechanics there is no clear-cut separation between observer and what is observed, for the kinds of experiments one chooses to carry out will affect the results — e.g., whether an electron displays wave or particle properties. But this does not simply mean that “the mind creates its own reality.” You must not only think about what observation to make but actually go into the laboratory, set up the apparatus, and make the observation. Quantum theory does have some weird concepts, but psychokinesis isn’t one of them.

“Quantum non-locality” means that the probabilities for particles that have once interacted continue to be “entangled” even when they are separated by great distances. This and the connection between system and observer mean that the quantum world is relational. Some writers have drawn analogies here with theological

topics, such as the relations between the persons in the Trinity or the fact that we are fully human only in relationships and not in isolation.

But we should not always emphasize holism, because it's hard to solve problems if you try to include everything in the world. Quantum mechanics can describe the hydrogen atom fairly well by considering a single electron and proton and ignoring all the other particles in the universe. And while "no man is an island," it does make some sense to talk about individual human beings.

Popular misconceptions are not limited to the physical sciences. Ethical and theological issues related to genetics and its applications have become very important in recent years, and the word "gene" often gets used in careless ways. Some people use the word but still think in terms of the old pre-Mendelian paint-mixing model of heredity.

Mendel showed that some features of heredity can be explained with a model in which an organism inherits one gene (he called them "factors") for a trait from each parent. The trait that is expressed is determined by the "dominant" or "recessive" character of those genes. We now identify genes with segments of DNA.

This simple model works in some cases, but many others require a more detailed elaboration of the model. Some traits involve complex interactions of the effects of a number of genes. Often a gene confers only a predisposition for a trait and doesn't ensure that it will be expressed, as with the genes for breast cancer.

There are other misconceptions that could be addressed, such as the belief that biological evolution as a scientific theory is about "progress," but these will have to do. Consider this column, if you wish, simply a rant against bad science. I hope that it won't discourage preachers and teachers from speaking about faith-science issues but that instead they will take the trouble to learn what the science really is.

Some basic popular resources for the topics I've mentioned are:

- Albert Einstein, *Relativity: The Special and the General Theory* (Crown, 1971)
- James Gleick, *Chaos: Making a New Science* (Penguin, 1988)
- John Polkinghorne, *The Quantum World* (Princeton, 1989)
- Lynn Buczynski, *Genetics: Nature's Blueprints* (Lucent, 1991)

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