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THE ECONOMIC PAMPHLETEER
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Rethinking science: The highest research priority for the next 5 years

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At the risk being labeled an uneducated Luddite or a right-wing political conservative, I believe the highest research priority for the next five years should be to rethink science, in concept and in practice. Nowhere is this priority more urgent or important than in research related to food systems, including agriculture. Recent research seems to indicate that overall public confidence in science has remained relatively strong and stable since the 1970s, at least among most Americans (Gauchat, 2012). However, the research indicates that public trust has declined significantly among those who think science should mesh with common sense, who question industrialization, and who are

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*Why did I name my column "**The Economic Pamphleteer**"? Pamphlets historically were short, thoughtfully written opinion pieces and were at the center of every revolution in western history. Current ways of economic thinking aren't working and aren't going to work in the future. Nowhere are the negative consequences more apparent than in foods, farms, and communities. I know where today's economists are coming from; I have been there. I spent the first half of my 30-year academic career as a very conventional free-market, bottom-line agricultural economist. I eventually became convinced that the economics I had been taught and was teaching wasn't good for farmers, wasn't good for rural communities, and didn't even produce food that was good for people. I have spent the 25 years since learning and teaching the principles of a new economics of sustainability. Hopefully my "pamphlets" will help spark a revolution in economic thinking.*

skeptical of the "intellectual establishment."

I am an unabashed advocate of common sense, an open opponent of the industrial paradigm, and a frequent critic of an increasingly arrogant intellectual establishment. I have not lost confidence in science, at least not science defined as a systemic means of acquiring knowledge. I have lost confidence in scientists who insist that "good science" includes only those propositions that have been *proven* using the "scientific method."

The scientific method is a specific process of formulating hypothesis and testing their validity through various structured and systematic means of observation and replication. The scientific method assumes a world of absolute reality, of a unique or singular truth. The purpose of science then is to discover absolute truth. The scientific method also assumes that complex systems can be reduced or separated into their component parts to isolate specific causes of specific effects. Once discovered, the scientific method says that true cause and effect relationships can be verified through replication, since absolute truth for one condition or situation is true of all conditions or situations. Although the truth of a hypothesis can never be proven absolutely, it can be validated or repudiated thorough replication.

The scientific method has proven very effective in acquiring knowledge of the nonliving or mechanistic world. Few would deny the importance of knowledge gained through the scientific method in physics, chemistry, electronics, engineering, or architecture. However, it has been far less effective in providing knowledge of the living or organismic world. In plant science, animal science, and entomology, for example, unanticipated consequences invariably emerge from actions guided by so-called good science. In the thinking, feeling world of the social sciences, the scientific method has provided little if any advantage over systematic observation and logical synthesis of subjective data guided by common sense. Unfortunately, the most urgent and compelling questions confronting humanity today, including the integrity of the global food system, relate to the living, thinking, and feeling worlds of ecology, economics, and sociology.

The ecological, social, and economic problems of today are critical and urgent. Thus, the highest priority for food systems research is to rethink and redesign the fundamental concept and practice of science. Nothing less than the future of humanity is at risk. Scientists can no longer afford the luxury of trying to warp and twist the reality of the living, thinking, feeling world to make it conform to the scientific method rather than redesign their methods of scientific inquiry to conform to ecological, social, and economic reality.

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The living world is holistic, not reductionist. The first principle of ecology is that everything is interconnected; you can't isolate specific causes or effects from other causes and effects. Plants, animals, and people, economies, and societies are all living, interconnected systems. Unintended consequences must be an integral aspect of the science of living systems. Most scientists understand the limitations of reductionist approaches to research, but they haven't found an effective alternative to the scientific method in claiming credibility for their work.

Rethinking science must begin with rethinking reality. Perhaps living reality is not unique or singular, but exists as *potentials,* as in the subatomic world of quantum reality. Two scientists who draw different conclusions may simply have observed two different potentials of the same reality. If so, the question is not who discovered absolute truth but how knowledge of each potential or dimension of truth contributes to a better understanding of the whole truth. This does not suggest that truth is relative, as was suggested by earlier philosophers, but instead that truth is multidimensional in that it

has multiple potentials. Truth cannot be whatever one might want it to be, but only what it has the potential to be. For example, a dog has the potential to be seen as large or small and threatening or friendly, depending on the particular observer. It has multiple potentials. But, it cannot be seen as a cat or snake by any rational observer.

In the living, thinking, and feeling worlds, reality can be seen as the potential "to become" and well as the potential "to be." Thus, scientists who draw different conclusions about the future based on a common understanding of the past and present may simply be seeing different future potentials. The question is not which is right or wrong, but instead which of those future sets of potentials would be best for the future of society and humanity. In a world of potentials, we could choose from a variety of alternative possibilities for our future, rather than accept the prospect of the mechanistic, absolute, predetermined reality of contemporary scientific thinking.

In a holistic world of potentials we could be guided by general principles rather than specific causes and effects. The purpose of science would be to discover underlying principles that characterize the potentials of the world that we want to experience and the world we want to avoid. Some of these principles are self-evident, such as the ecological principles of holism, diversity, and mutuality and the social principles of trust, compassion, and courage. Some of the principles essential for sustainability obviously are yet to be discovered, including the principles necessary to motivate people to positive action. A sustainable food system is essential for the sustainability of humanity. The highest research priority over the next five years for food systems research, and for research in general, should be to rethink and redesign science to meet the ecological, social, and economic challenges of sustaining humanity.

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