

# Can We Trust the Logic of Function?

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Walter R. Thorson has shown that to understand biological systems, one needs more than the present simple mechanical models imported from the physical science. As he has documented, others have also seen and addressed this problem. The solution of adding in an "organizational logic" component appears to be a viable option. My comments are not to detract from this vision but to introduce a few cautionary affirmations.

The goal of physical science is to form theories that model the behavior of physical systems. Thorson gives much credence to the idea of physical "laws," seeming to imply that they are close to the truth of the universe. For example, he writes:

> The laws of physics appear to provide a valid, coherent structural and mechanical account of the world—*including* biological systems. I do not think that we lack some unknown but essential principle of physics needed to account for the physical and chemical processes occurring in biosystems, or that the study of biological behavior will turn up mysterious violations of currently understood physical principles (p. 14).

Physicists today keep referring to such concepts as "Newton's laws of motion" simply for historical reasons and not because they are any more absolute than other physical theories. In the process, Thorson implies that the set of models in physical science is essentially closed. He thus places aside such ideas as "quantum uncertainty or chaotic dynamic instability" (p. 14) when, in fact, it could well be these ideas, and others yet to be formulated, that may be most applicable to biological systems. Physics and its models are not a closed system. Rather, physical theories are continuously being tested, revised, replaced, and added to.

New advances in science come about because of inadequacies (or "holes") in present concepts and models, but the presence of such shortfalls in a model should not be the main support for postulating a new idea. In other words, we should be careful not to throw out the idea that at some point in time physical theories or models may explain certain biological facts although they do not do so now. Simply because it is impossible in quantum mechanics to do the necessary mathematical calculations for a completely *ab initio* description of the behavior of electrons in a molecule does not mean that the underlying physical model is inadequate. Similarly, just because a physical model does not appear to be able to explain all of the functionality of a biological system does not imply that that physical model is incorrect. On the other hand, I affirm the notion that insurmountable complexities in a scientific model do open the door for scientists to propose approximations and refinements to such a model to make its conclusions tractable. Thus, the idea of "organizational logic" may be a very important addition to our models for understanding the functionality of biosystems.

A good scientific theory should predict new observations as well as explain previous observations. Just as we know that our view of Yahweh must be more than a compilation of the gaps in our understanding, so a good scientific theory should be more than only a proposal to fill the gaps in our knowledge of our physical and biological world. In my opinion, more quantitative explanations and predictions could strengthen Thorson's ideas. If these ideas are reasonable scientific proposals, then they should be testable or else they are essentially only philosophical. While Thorson examines several systems and shows how the idea of a logic of function is applicable, it is not clear to me how one should proceed to test this idea. Maybe that is where researchers need to begin in exploring this concept further. ◊

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