Extended Quotation on

Realism versus Constructivism in Systems Science

From: G.J. Klir, “On the complementarity of systems science and classical science.” In *Toward New Paradigm of Systems Science*, ed. by Yong Pil Rhee, Seoul National University Press, 1999.

The question regarding the meaning of systems is one of the most fundamental epistemological issues of science, and particularly of systems science. By and large, two opposing positions on this issue have been advanced and debated since the emergence of systems science. They are based on two very different views about the nature of knowledge: *realism* and *constructivism.*

According to realism, each system that is obtained by applying correctly the principles and methods of science *represents* some aspect of the real world. This representation is only approximate, due to limited resolution of our sensors and measuring instruments, but the relation comprising the system is a *homomorphic image* of its existing counterpart in the real world. When we develop and use more refined instruments, the homomorphic mapping between entities of the system of concern and those of its real-world counterpart (the corresponding “real system”) becomes also more refined, and the system becomes a better representation of its real-world counterpart.

Realism thus assumes the existence of systems in the real world, which are referred to as “real systems.” It claims that any system obtained by sound scientific inquiry is an approximate (simplified) representation of an existing real system via an appropriate homomorphic mapping. The role of science is to discover the existing real systems and develop their increasingly more refined representations.

According to constructivism, all systems are artificial abstractions. They are not made by nature, but we construct them by our perceptual and mental capabilities within the domain of our experiences. The concept of a system that requires a correspondence to its presumed real-world counterpart is illusory because there is no way of checking such correspondence. We have no access to the real world except through experience.

It seems that the constructivist view, particularly in the way in which it is formulated by Ernst von Glasersfeld [*Radical Constructivism,* Falmer Press, London, 1995], has become predominant in systems science. According to this formulation, constructivism is neutral on ontological questions. It is concerned with the nature and scope of knowledge, not with questions regarding the ultimate nature of reality. Therefore, it does not require that ontological reality be denied. Moreover, it insists that the constructed systems are not arbitrary, but they must not collide with the constraints of the experimental domain.

According to the constructivist view, the aim of constructing systems is to organize our experiences in useful ways. A system is useful if it helps to achieve some aims, for example, to predict, retrodict, diagnose, control, make proper decisions, etc. Since systems we construct must respect constraints of our experiential domain, obtained via our interactions with the world, they have some specific relevance to the real world. However, the existence of real-world counterparts of the constructed systems is neither presumed nor needed.

The constructivist position liberates us from the commitment (inherent in realism) of viewing systems we deal with as representations of real systems. This commitment is vacuous since we have no access to the original systems to be represented—the presumed real-world systems. Hence, we could define homomorphic mappings between these pairs of systems (assuming, of course, the existence of real-world systems) only if we were omnipotent. Then, however, we would not have to worry about epistemology at all.