



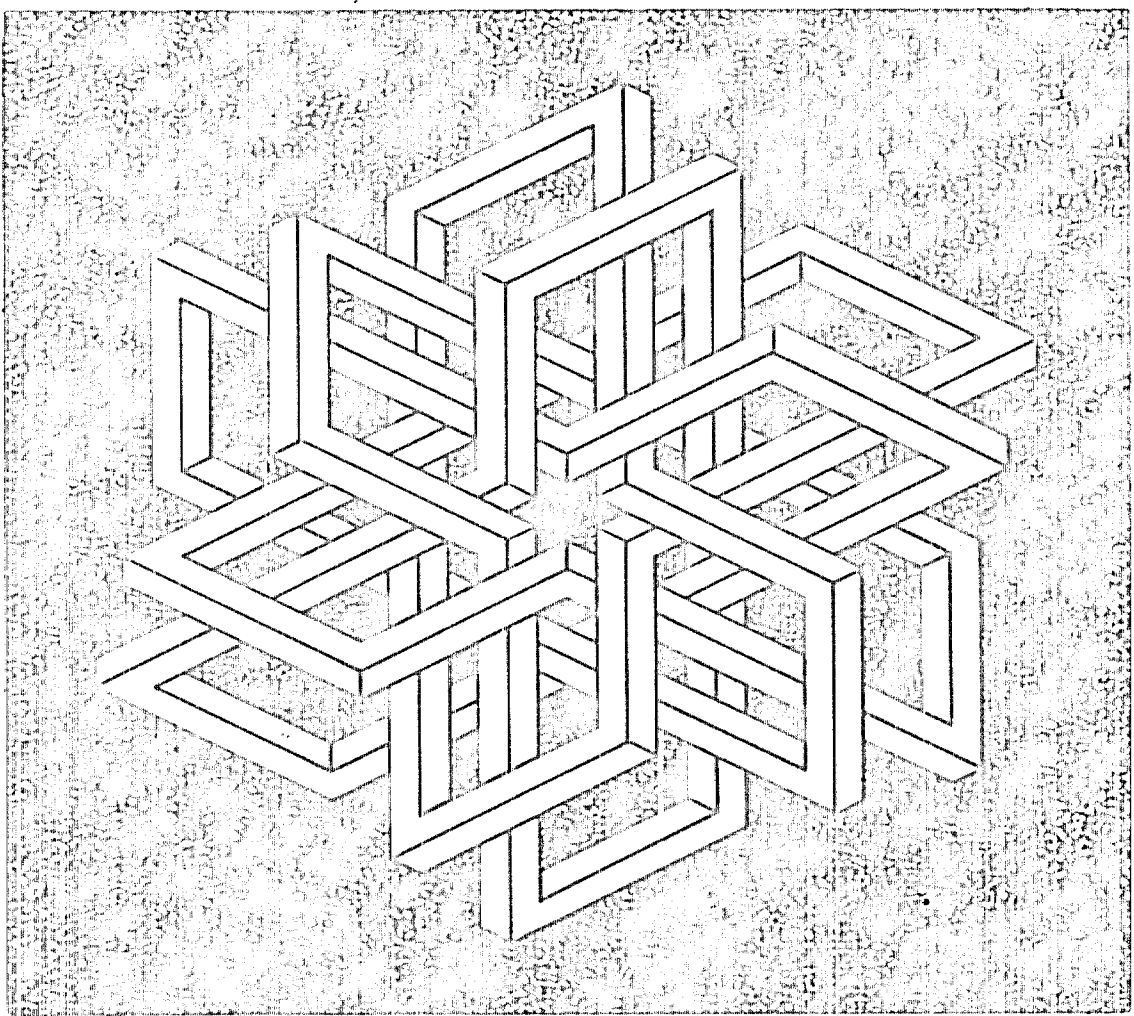
# Symmetry: Culture and Science

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SYMMETRY ARGUMENTS IN ROMANTIC NATURAL PHILOSOPHY

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Romantic Natural Philosophy (RNP) is a stream within European philosophy and the Romantic movement that is mainly connected with German and Scandinavian scientists (like Oken, Richter, Steffens, Oersted). Since they are closely affiliated with the German, strictly anti-empiristic "idealistic" philosophy, esp. to Schelling, they often hardly are accepted as "scientists". Yet, science owes to them such important discoveries as electro-magnetism (Oersted), energy conservation (J.R.Mayer) and modern phenomenological crystallography (S.Weiß). This success was rendered possible by an extended use of mathematics, esp. by peculiar arguments based on symmetrical views about the world.

According to the idealistic philosophical basis, mathematics figures as an "a priori" tool of guessing at natural laws, since philosophical pre-theories about the structure of the whole world include Man and his formal mental structures as a part of nature - and vice versa.

Furthermore, RNP is characterized by an "organic" understanding of nature: nature cannot be understood only as "rhapsodic" bundle of empirical laws, but as a generative, a productive autonomous system, whose laws have to be traced back to their common roots, thus giving true understanding of productive nature and her relation to Man only in their interdependent context. Given a specific empirical law, progress of knowledge will favorably be stimulated by guessing on what will be the systematic correlate. Thus, correspondency principles will become a preferred tool of investigation, and since these correspondencies must be expressed in mathematical terms, they tend to be formulated as symmetry principles.

As a third aspect, the investigation of mere perceptive phenomena is not sufficient for reasons of philosophical dignity; rather, they must be examined for their underlying principles which, according to the Platonistic tradition, as "ideas" are expected as constant (whilst their "appearances" change). So the search for conservative magnitudes, of "substantial qualities", becomes a favorite topic in RNP.

Thus, RNP scientists are the first to combine the search for conservative magnitudes and of symmetries, and to introduce this into science as a basic and stable strategy of research. This continues to be the case up

till today, e.g. in physics of elementary particles. Yet, what RNP - being ill famed soon afterwards - had found out by philosophical motivation, was justified mathematically not earlier than in early 20th century when Emmy Noether proved the equivalence of symmetries and conservational laws in physics.

Finally, with respect to RNP's understanding of mathematics as the expression of the formal qualities of human mind - of that quality that makes human mind touching the divine - mathematics becomes the medium of development of human beings at all. RNP educators in peculiar made symmetries and symmetric objects of perception the favorite tool of elementary education, because these relate visual with formal characters.

This holds esp. for the Great Three of german speaking education in early 19th century, Pestalozzi, Herbart, and Froebel. Each of them exposed an educational system based on symmetric objects by perception as well as action (square, triangle, sphere), that is meant for the benefit of both, formal skills and general humane erudition. The latter, Froebel, developed his ideas in direct, productive contact with the crystallography of RNP.

RNP, in concentrating on Man as the focus of mathematics and nature, does not always avoid the danger of reading as natural laws what is just formal imagination; on the other hand, it keeps science from fruitless empiristic rigidity; it gives instructive insight into the meaning and stimulating role of controlled imagination in science. Thus, symmetry might become a paradigm for current study of the evolution of human mind.