

# Introduction

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These papers resulted from the first workshop in a series exploring concepts that are of central importance to all of the sciences. The series will bring together the perspectives of natural and social sciences and the humanities in intimate, cross-disciplinary dialogue. The intention is to improve our understanding of the concepts discussed by emphasizing their different uses in the many different disciplines, while at the same time focusing on shared concerns and structural commonalities. And this is the peculiarity of the concepts to be examined here – they do not get defined in just one discipline, so that they only form part of the basic concepts of *that* discipline, as distinguished from the basic concepts of other disciplines. Rather, their unique character derives from the fact that they have different uses in different disciplines, and all of them in the foundations of the respective sciences. The concepts of natural law, causality, of complexity and truth, scientific truth, are of this kind, and so is the concept of symmetry, with which we will start this series.

As we all know, this concept has many different (scientific) meanings, while the basic meaning remains stable. In geometry, for instance, mirroring, rotation and periodicity prove to be symmetry-properties, that is, self-copies (automorphisms) of spaces, which leave the structure of figures and bodies unchanged (invariant). In natural philosophy, symmetry is the property of natural objects to remain invariant under certain operations, namely symmetry-operations. In logic, a two-place relation  $R$  is symmetric on a set  $S$ , if for any two elements  $x$  and  $y$  from that set, the following is the case: if the relation  $R$  holds between  $x$  and  $y$ , then it also holds between  $y$  and  $x$ . In argumentation theory, an argumentative situation is symmetric if rights and duties of the persons in that situation are reciprocal. Finally, the symmetry principle as a research principle says that theories should have symmetry properties that represent the fundamental symmetry structures of nature. In aesthetics, many of these diverse conceptions are linked to evidence familiar to us from the everyday world. The cultural interest of symmetry is also present in the arts, in the symbolism of religious expressions and in the fields of linguistics and human anthropology; it also plays interesting roles in evolutionary processes as well as in biology and chemistry more generally.

The Academia Europaea also pursues another objective with this series of workshops. We want to emphasize the importance of debates in the foundations of the sciences in the European research area. Basic research has, compared to applied research – and in particular, technology-oriented research – received very little support. With the introduction of a European Research Council, which the Academia Europaea has supported emphatically in the last year, this should change. It is in this spirit that we try to attract attention to the significance of support for such research, not just of the researchers themselves, with our series on ‘Basic Ideas in Science’ beginning today.

You might also be interested to hear that each workshop will be published. The resulting series will form an *Encyclopaedia of Basic Ideas in Science*. In this respect, this series pursues not just the aims of science and science policy, but also of the systematic of science. The approach is fundamentally philosophical. However, the resulting series would distinguish itself from, for instance, the respective anthologies on *Truth* or *Explanation* in the *Oxford Readings in Philosophy* (which, to my knowledge, is currently the main comparable series of publications) by addressing the topic not primarily from the philosophical viewpoint only. The aim is not to present a single and complete philosophical analysis of each of the concepts, but to demonstrate that the variety of legitimate uses, in the different disciplines, might not be reducible to a philosophically primitive account. In this it emphasizes the legitimate varieties of use of these basic ideas in science.

I thank all participants, especially the speakers; in particular, Jules Deutsch of the Université Catholique de Louvain, who has prepared this workshop.