*The Many Faces of Beauty*

# *the* Many Faces *of* Beauty

*edited by*

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*University of Notre Dame Press*

*Notre Dame, Indiana*

Notre Dame, Indiana 46556
www.undpress.nd.edu


Manufactured in the United States of America

*Library of Congress Cataloging-in-Publication Data*

The many faces of beauty / edited by Vittorio Hösle.
p. cm.
Includes bibliographical references and index.
ISBN 978-0-268-01119-2 (pbk. : alk. paper)—
ISBN 0-268-01119-2 (pbk. : alk. paper)
1. Aesthetics. I. Hösle, Vittorio, 1960– editor of compilation.
BH39. M3858 2013
111'.85—dc23

2013000461

∞ *The paper in this book meets the guidelines for permanence and durability of the Committee on Production Guidelines for Book Longevity of the Council on Library Resources.*

# CONTENTS

# INTRODUCTION

VITTORIO HÖSLE

Increasing specialization is the inevitable fate of almost all disciplines, due to the growth of knowledge produced by ever more scholars in the field. On the one hand, this allows disciplines to achieve a precision unknown in earlier generations; and for that, one cannot be grateful enough. On the other hand, the danger of specialization is obvious: There are questions that by their very nature are located across the disciplines, and they tend to be neglected in the contemporary era, even if they were regarded by the earlier philosophical tradition as the ultimate problems. This is particularly true if there is a normative dimension involved, for normative propositions are of a different nature than descriptive ones, and modern methodologies, linked to empiricism as their basic epistemology, tend to limit themselves to the descriptive realm. The Notre Dame Institute for Advanced Study was founded as a place where scholars might reflect on such ultimate questions, which demand an interdisciplinary approach as well as normative analyses.

As the subject of its inaugural conference in January 2010, the elusive topic of beauty was chosen; in 2011 and 2012, conferences on goodness and truth followed. The Institute was well aware of the fact that the modern arts define themselves only to a very limited degree through beauty. At the same time, the modern sciences, particularly biology, have shed new light on why the desire for beauty is such an important factor in human behavior. The conference thus aimed at bringing people together

from the sciences, the humanities, and the arts; there was a deliberate choice to invite a painter, a composer, and a poet instead of only scholars who write about the arts without being themselves creative in the arts.

There was also a conscious effort to bring together people with very different cultural backgrounds. The participants were not all U.S.-Americans, but included scholars and artists at least originally from Canada, Ireland, Denmark, Germany, Italy, Russia, Israel, and India. Each of them was asked a specific question (which he or she could modify) with regard to the connections between his or her discipline and the problem of beauty. The sequence of the lectures and the essays corresponds to an order of the single disciplines that is vaguely inspired by Hegel's encyclopedia; the sixteen essays are divided into five different sections. Mathematics is the foundational discipline, on the basis of which physics and biology try to explain inanimate nature as well as life. Therefore in the first section a mathematician, a physicist, and two philosophers with degrees in biology and physics, respectively, deal with beauty in mathematics and nature. An anthropologist, a psychologist, a historian of law, and an economist address in the second section the place of beauty in the human mind and in society. An explicit philosophical reflection occurs in the third section on notoriously vexing issues, such as the historicity of aesthetics itself, interculturality, and the place of the ugly. In the fourth section, painting, music, poetry, and film are debated, mainly by authors who are themselves artists. As befits a Catholic university, the final essay, written by a theologian, reflects on the relation between beauty and God.

As far as I can see, there is no other book in which practitioners of so many disciplines try to interpret the various facets, or "faces," of beauty. This is a vantage point for which the price of very different methodologies speaking their different languages is well worth paying. Needless to say, several classical questions of aesthetics remain unaddressed; among the arts, architecture, acting, and dance had to be ignored given the amount of time granted to the conference. Even if this book cannot replace a complete aesthetics, I harbor little doubt that it will be useful to all those who aim at such a complete aesthetics.

Aristotle had already addressed the question of whether there is beauty in mathematics (*Metaphysics* M3), an issue certainly inspiring for the work in the Platonic Academy, which laid the foundations for Euclid's *Elements*. (Kant will ask the question again in §62 of the *Critique of*

*Judgment*, but due to his idea that beauty cannot be conceptually determinate, he will find beauty not in theorems but only in proofs, since there is a plurality of the latter for most given theorems. Archimedes, according to Plutarch, *Life of Marcellus* 17.4, treaded a middle ground.) Every reader of Euclid is struck by the beauty of several of the mathematical objects described, from the regular pentagon to perfect numbers, by the elegance of some proofs, such as of the irrationality of $\sqrt{2}$, and by the complex architectonic that connects the various books, the regular bodies in the thirteenth book mirroring the regular polygons in the fourth book. Even if Greek mathematics is great and valid mathematics in a way in which Greek physics is not valid science, mathematics has progressed enormously in the course of the 2,500 years of its existence. Thus it is a particular privilege that the first paper is by one of the eminent mathematicians of our time, Robert Langlands, who since 1967 has formulated the Langlands program, a system of conjectures connecting various mathematical disciplines. His paper, "Is There Beauty in Mathematical Theories?" is a research paper directed at Langlands' fellow mathematicians, but it is full of insights for a broader audience. It constitutes a classic statement of an age-old problem for the twenty-first century, and it is also fascinating because of various interspersed autobiographical remarks. Langlands shuns the opinions of the mainstream and relies on "decades of experience and a spontaneous, unmediated response to the material itself." Even more than beauty, it is the possibility of greatness in mathematics that fascinates Langlands, which he articulates as "majesty and endurance" (Kant would have spoken of "sublimity"), diametrically opposed to what he calls the meretricious. But he recognizes that greatness is unthinkable without beauty. The delight in simple solutions is genuine, particularly if these are surrounded, like precious ores, by worthless gangue. "To what extent it is possible to become a serious mathematician without, at least initially, an appreciation of these simple joys is not clear to me." Thus, Langlands warns, in a vein analogous to that of the Platonic Thamus, against the replacement of innate or acquired mathematical skills by machines. Dealing with mathematical theorems, Langlands distinguishes their value within the theory in which they are demonstrated and serve to demonstrate other theorems from their importance transcending this instrumental value. Fermat's theorem is mentioned as a shining example: "Without theorems of this sort, a theory in pure mathematics would be an insipid intellectual exercise." Carl Gustav

Jacob Jacobi's famous statement that pure mathematics serves the honor of the human spirit is regarded by Langlands with melancholy skepticism. In the bulk of his paper, Langlands deals with the connections between the various disciplines of mathematics. Even if he does not say it explicitly, he seems to recognize a beauty in the fact that the various mathematical disciplines are far more related to each other than is apparent at first glance: The organic unity of mathematics and the fact that this unity is not obvious but hidden seem to point to general concepts insisted upon by aesthetic theory, for every great artwork is characterized by a unity of different parts that seem to be autonomous and only slowly reveal their connections. Through his analysis of the long historical way in which such connections were discovered, Langlands is brought to recognize that history may well matter for mathematical value: "The relation between the intrinsic value of a mathematical notion and the depth of its historical roots is subtler than I suggested." Langlands draws our attention to the fact that mathematical language may facilitate progress without this already proving a superior grasp. In connection with Euclid's cumbersome tenth book he writes: "That is not evidence for our superior intelligence, but for the advantages of the algebraic formalism." The increase of mathematical knowledge makes later mathematicians, who do not have time to master all the details, inevitably superficial: "I see no obvious remedy except too sharp a focus and that is worse." Langlands avers that the most abstract beauties in mathematics, as those of some symmetries, are not visual; they are different both from those of elementary geometry and "our sensuous pleasure in fluid flow or other kinds of movement." In his last note he writes of the "intellectual pleasure of creating order from seeming chaos." The question of how exactly the beauty of a theorem relates to the intellectual effort necessary to demonstrate it seems to deserve a further analysis. Would Fermat's theorem still fascinate us if the Taniyama Shimura conjecture had been proven first, and people had only later discovered Fermat's theorem as a consequence from it?

Mario Livio is a well-known astrophysicist from the Space Telescope Science Institute and the author of several fascinating and best-selling books on the history and philosophy of mathematics. His paper, "Symmetry: From Perception to the Laws of Nature," deals with the importance of the various types of symmetries in both inorganic nature and in life, where bilateral symmetry has enormous advantages—"you get