

*Routledge Research in Phenomenology*

# **PHILOSOPHY'S NATURE: HUSSERL'S PHENOMENOLOGY, NATURAL SCIENCE, AND METAPHYSICS**

Emiliano Trizio



# Philosophy's Nature: Husserl's Phenomenology, Natural Science, and Metaphysics

This book offers a systematic interpretation of the relation between natural science and metaphysics in Husserl's phenomenology. It shows that Husserl's account of scientific knowledge is a radical alternative to established methods and frameworks in contemporary philosophy of science.

The author's interpretation of Husserl's philosophy offers a critical reconstruction of the historical context from which his phenomenological approach developed, as well as new interpretations of key Husserlian concepts such as metaphysics, idealization, life-world, objectivism, crisis of the sciences, and historicity. The development of Husserl's philosophical project is marked by the tension between natural science and transcendental phenomenology. While natural science provides a paradigmatic case of the way in which transcendental phenomenology, ontology, empirical science, and metaphysics can be articulated, it has also been the object of philosophical misunderstandings that have determined the current cultural and philosophical crisis. This book demonstrates the way in which Husserl shows that our conceptions of philosophy and of nature are inseparable.

*Philosophy's Nature* will appeal to scholars and advanced students who are interested in Husserl and the relations between phenomenology, natural science, and metaphysics.

**Emiliano Trizio** is Senior Lecturer in Philosophy at the University of the West of England, Bristol, UK.

## **Routledge Research in Phenomenology**

Edited by Søren Overgaard

*University of Copenhagen, Denmark*

Komarine Romdenh-Romluc

*University of Sheffield, UK*

David Cerbone

*West Virginia University, USA*

### **Phenomenology, Naturalism and Science**

A Hybrid and Heretical Proposal

*Jack Reynolds*

### **Imagination and Social Perspectives**

Approaches from Phenomenology and Psychopathology

*Edited by Michela Summa, Thomas Fuchs, and Luca Vanzago*

### **Wittgenstein and Phenomenology**

*Edited by Oskari Kuusela, Mihai Ometiță, and Timur Uçan*

### **Husserl's Phenomenology of Intersubjectivity**

Historical Interpretations and Contemporary Applications

*Edited by Frode Kjosavik, Christian Beyer, and Christel Fricke*

### **Phenomenology of the Broken Body**

*Edited by Espen Dahl, Cassandra Falke, and Thor Erik Eriksen*

### **Normativity, Meaning, and the Promise of Phenomenology**

*Edited by Matthew Burch, Jack Marsh, and Irene McMullin*

### **Political Phenomenology**

Experience, Ontology, Episteme

*Edited by Thomas Bedorf and Steffen Herrmann*

### **Levinas and Analytic Philosophy**

Second-Person Normativity and the Moral Life

*Edited by Michael Fagenblat and Melis Erdur*

### **Philosophy's Nature: Husserl's Phenomenology, Natural Science, and Metaphysics**

*Emiliano Trizio*

For more information about this series, please visit: [www.routledge.com/Routledge-Research-in-Phenomenology/book-series/RRP](http://www.routledge.com/Routledge-Research-in-Phenomenology/book-series/RRP)

# Philosophy's Nature: Husserl's Phenomenology, Natural Science, and Metaphysics

Emiliano Trizio

First published 2021  
by Routledge  
52 Vanderbilt Avenue, New York, NY 10017

and by Routledge  
2 Park Square, Milton Park, Abingdon, Oxon, OX14 4RN

*Routledge is an imprint of the Taylor & Francis Group, an informa business*

© 2021 Taylor & Francis

The right of Emiliano Trizio to be identified as author of this work has been asserted by him in accordance with sections 77 and 78 of the Copyright, Designs and Patents Act 1988.

All rights reserved. No part of this book may be reprinted or reproduced or utilised in any form or by any electronic, mechanical, or other means, now known or hereafter invented, including photocopying and recording, or in any information storage or retrieval system, without permission in writing from the publishers.

*Trademark notice:* Product or corporate names may be trademarks or registered trademarks, and are used only for identification and explanation without intent to infringe.

*Library of Congress Cataloging-in-Publication Data*  
A catalog record for this book has been requested

ISBN: 978-0-367-43912-5 (hbk)

ISBN: 978-1-003-00747-0 (ebk)

Typeset in Sabon  
by Apex CoVantage, LLC

**A mio padre Eugenio, in memoria**

**Sono parole in una lingua diversa, ma amica**



Taylor & Francis

Taylor & Francis Group

<http://taylorandfrancis.com>

# Contents

<i>Acknowledgments</i>	xi
<i>List of abbreviations</i>	xii
<b>Introduction and Plan of the Work</b>	<b>1</b>
<i>Plan of the Work</i>	6
<i>Chapter One: The Relation Between Physical Theory and Reality: Historical and Conceptual Material</i>	6
<i>Chapter Two: Husserl's Conception of Natural Science Between the Theory of Knowledge and Metaphysics</i>	7
<i>Chapter Three: Transcendental Consciousness and Nature</i>	7
<i>Chapter Four: The Transcendental Constitution of Material Nature</i>	8
<i>Chapter Five: Life-World, Natural Science, and the Crisis of Philosophy</i>	9
<b>1 The Relation Between Physical Theory and Reality: Historical and Conceptual Material</b>	<b>11</b>
§1. <i>The Problem of the Object of Physical Theory at the Time of the Decline of the Classical Mechanistic Worldview</i>	11
§2. <i>The Problem of the Limits of Physical Knowledge: Du Bois-Reymond</i>	13
§3. <i>Ernst Mach's Phenomenalism and the Elimination of the Limits of Physical Knowledge</i>	17
§4. <i>Hermann Von Helmholtz, Critical Realism, and the Shifting Limits of Physical Knowledge</i>	21
§5. <i>Summary and Conclusion</i>	25



<b>2</b>	<b>Husserl's Conception of Natural Science Between the Theory of Knowledge and Metaphysics</b>	<b>36</b>
§1.	<i>Husserl's Early Interest in Metaphysics: The Example of the Metaphysics of Space</i>	36
§2.	<i>The Problem of Knowledge as the Determining Factor of the Conception of Reality</i>	41
§3.	<i>Natural Science's Ontological Inadequacy and Metaphysics as the Ultimate Science of Reality Completing It</i>	46
§4.	<i>Natural Science and Metaphysics in the Logical Investigations</i>	51
§5.	<i>The Metaphysical Closure of the Empirical Sciences in the Years of Husserl's Transcendental Turn and an Indication of the Investigations Necessary for It</i>	58
§6.	<i>Regional Ontology</i>	65
§7.	<i>Transition to Transcendental Phenomenology: The Ontology of Nature as Explication of the General Formal Sense of What Is Posited by the Natural Attitude</i>	71
§8.	<i>Transcendental Phenomenology and the Theory of Knowledge</i>	73
§9.	<i>Transcendental Phenomenology and Metaphysics as the Ultimate Science of Reality</i>	80
§10.	<i>Summary and Conclusion</i>	85
<b>3</b>	<b>Transcendental Consciousness and Nature</b>	<b>97</b>
§1.	<i>The Centrality of the Thing of Perception in the Delimitation of the Region of Pure Consciousness</i>	97
§2.	<i>Husserl's Critique of Naïve Realism and of the Traditional Formulation of the Primary/Secondary Quality Distinction</i>	101
§3.	<i>The Target of Husserl's Critique: The Wrong Sense of Transcendence Underlying Critical Realism</i>	106
§4.	<i>Husserl's Solution to the "Two Things Problem"</i>	110
§5.	<i>The Mythical Causal Depth of Reality</i>	115
§6.	<i>Hypotheses About Nature's Sensuous Determinations and Hypotheses About Nature's Intrinsic Categorial Determinations</i>	118
§7.	<i>Criticism of the Interpretations Based on Contemporary Philosophy of Science</i>	124

	§8. <i>Transcendental Phenomenology and Existence Claims</i>	138
	§9. <i>Summary and Conclusion</i>	141
<b>4</b>	<b>The Transcendental Constitution of Material Nature</b>	<b>151</b>
	§1. <i>Transition to the Stepwise Constitution of Material Nature in Ideas II</i>	151
	§2. <i>The Thing and the Aesthetic Leib: From the Thing of Perception to the “Empty X”</i>	154
	§3. <i>The “Empty X” and the Objective Space as the Form of All Possible Things</i>	159
	§4. <i>Physical Theory as the Ultimate Objectivation of Material Nature</i>	164
	§5. <i>The Relation Between Husserl’s Conception of Material Nature in Ideas I and Ideas II and the Krisis</i>	168
	§6. <i>The Problem of the Transcendental Status of Husserl’s Constitutive Analysis in Ideas II: A Response to Ingarden’s Critiques</i>	174
	§7. <i>Transcendental Phenomenology and the Debate on the Relation Between Science of Nature and Metaphysics</i>	184
	§8. <i>Transcendental Phenomenology and the Challenge of the “New Physics”</i>	189
	§9. <i>Summary and Conclusion</i>	194
<b>5</b>	<b>Life-World, Natural Science, and the Crisis of Philosophy</b>	<b>203</b>
	§1. <i>The Crisis of European Sciences as the Repercussion on Their Scientificity of the Crisis of Philosophy</i>	203
	§2. <i>The Crisis of Philosophy and the Forgetfulness of the World of Spirit</i>	207
	§3. <i>The Idea of Philosophy and the Origin of the Mathematical Science of Nature</i>	215
	§4. <i>The Background of Galileo’s Mathematization of Nature: The New Scientific Ideal</i>	219
	§5. <i>Pure Geometry (Krisis §9a)</i>	223
	§6. <i>The Mathematization of Sensible “Plena” (Krisis §§9b–9e)</i>	228
	§7. <i>Technization and Emptying of Sense (Krisis §§9f–9g)</i>	234
	§8. <i>The Life-World as the Forgotten Meaning-Fundament of Natural Science (Krisis §9h)</i>	241

§9. <i>First Consequences of Galileo's Misunderstandings</i> (Krisis §9i) 248	
§10. <i>The Significance and Nature of the Considerations</i> <i>About the Origin of Mathematical Physics</i> (Krisis §§9k–9l) 250	
§11. <i>Further Criticism of the Interpretations Deriving</i> <i>From the Philosophy of Science</i> 255	
§12. <i>The Life-World and the Relations Between the</i> <i>Naturalistic, Personalistic, and Transcendental</i> <i>Attitudes</i> 257	
§13. <i>The Problem of the Relation Between the</i> <i>Scientifically True World and the Life-World</i> 264	
§14. <i>Solution to the Problem: The Teleological</i> <i>Inclusion of the Scientifically True World in the</i> <i>Life-World</i> 270	
§15. <i>Nature in Itself as a Correlate of the Infinite</i> <i>Historicity of the Absolute Spirit</i> 273	
§16. <i>The Life-World and the Crisis of Philosophy</i> <i>as the Universal Science of Being Culminating</i> <i>in Metaphysics</i> 277	
§17. <i>Summary and Conclusion</i> 284	
<b>Conclusion</b>	300
<i>Index</i>	308

# Acknowledgments

I would like to express my sincere gratitude to my colleagues in the Philosophy Program at the University of the West of England: Charlotte Alderwick, Alison Assiter, Iain Hamilton Grant, Katrina Mitcheson, Francesco Tava, Sean Watson, and Dagmar Wilhelm. Their constant encouragement and precious suggestions have created the warm and collaborative environment that any author would like to enjoy while completing a book manuscript. I would also like to thank the faculty of the Venice Phenomenology Summer School: Daniele De Santis, Matteo Giannasi, Claudio Majolino, Burt Hopkins, and Nicolas de Warren. My research in phenomenology would not be possible without their friendship and their philosophical passion. Finally, I wish to express my special thanks to my friend Marco Rispoli, who has often come to the rescue with his unmatched knowledge of the German language and culture.

# Abbreviations

*Ideas I* = Husserl, E. (1983). *Ideas Pertaining to a Pure Phenomenology and to a Phenomenological Philosophy, First Book*. F. Kersten (Trans.). The Hague: Martinus Nijhoff.

*Ideas II* = Husserl, E. (1989). *Ideas Pertaining to a Pure Phenomenology and to a Phenomenological Philosophy, Second Book*. R. Rojcewicz and A. Schuwer (Trans.). Dordrecht: Kluwer.

*Ideas III* = Husserl, E. (1980). *Phenomenology and the Foundations of the Sciences*. T. Klein and W. Pohl (Trans.). The Hague: Martinus Nijhoff.

*Krisis* = Husserl, E. (1970). *The Crisis of European Sciences and Transcendental Phenomenology*. D. Carr (Trans.). Evanston, IL: Northwestern University Press.

# Introduction and Plan of the Work

The importance of Husserl's thought does not reside in the originality of its main themes – which, on the contrary, are extremely traditional – but on the uncompromised radicalness with which it redefines and addresses them.<sup>1</sup> Husserl stands above his contemporaries not for the questions he raised, but for the way in which he turned preexisting intellectual motives into a theoretical framework in which his cultural situation could be understood, criticized, and overcome. To a large extent, his cultural situation is still ours. That is why a serious discussion of Husserl's work should not consist merely in assigning to it a place in intellectual history, nor in reviving some of its specific theoretical results, but in bringing to light a style of thought that questions our very forms of intellectual life.

If one were to choose a single word to encapsulate Husserl's enterprise, that word, I contend, would not be “consciousness,” “phenomenon,” or “intentionality,” but “science.” The problem, however, is what is meant by this word. By the time Husserl began his philosophical career, philosophy and science had been the main characters of a centuries-long drama, but very few thinkers felt as powerful an urge to unearth the secret roots of that drama, to make it their life's work to recast the relations of human endeavors that we experience, nowadays, as sharply different. It has often been stressed that the German word “*Wissenschaft*” has a much broader scope than does the English “science,” for the former encompasses virtually all structured forms of knowledge, from jurisprudence to literary criticism. This caveat is both valid and helpful, but it only gives us a linchpin for appreciating the change of attitude required to approach Husserl's philosophy. First, for Husserl, science is not the name of a reality that awaits our exploration, but that of an ideal that we must strive to achieve. It corresponds to the infinite task of a *genuinely rational*, collective cognition of a specific objective domain expressible in the logical unity of a theory. Second, if, according to this ideal, there are as many sciences as distinct domains of investigation, *science* is, first of all, what *philosophy* should be in order to become more than a vague aspiration. Philosophy as a rigorous science – that is, accomplished

## 2 Introduction and Plan of the Work

philosophy – coincides with universal science based on absolute foundations, universal in that it unifies, encompasses, and grounds all other sciences, whether empirical or a priori and whether stemming from theoretical, axiological, or practical reason. Crucial to this attempt to reform the ideal of philosophy was the renewal of metaphysics, conceived both as the ultimate knowledge of reality resulting from the philosophical elucidation of the empirical sciences and as the discipline dealing with the “highest and ultimate questions” concerning the meaning of human existence and the idea of God. Husserl characterized his entire endeavor as the elaboration of a philosophy “from below”<sup>2</sup> the fundamental discipline of which was phenomenology, conceived initially as the ground of the radical critique of knowledge and subsequently as first philosophy, and the crowning achievement of which was metaphysics. Such is, for Husserl, the nature of philosophy.

Philosophy does not and cannot begin in a cultural void. Our age is no exception in this respect. Husserl characterizes the situation of the philosopher living in the “age of science” in the following manner. On the one hand, there is a consensus that philosophy has failed to become a rigorous science, and even to acquire a stable and progressive scientificity: philosophers do not cooperate in the gradual edification of a coherent body of shared theoretical results. On the other hand, philosophers live in a cultural context in which, while the idea of achieving genuinely rational insights into a given objective domain exists, it is only imperfectly instantiated even by the current special sciences. When the latter are in question, therefore, the “fact of science” appears as an aspect of the drama taking place before the philosopher’s eyes. The special sciences are human endeavors that fail to be what they strive to be, that is genuine sciences. Paradoxical though it might seem, the “fact of science” is that there is yet no real science at all, that what we call sciences are pale imitations of what they were intended to be and, more or less consciously, are striving to become. Yet, the *telos* immanent to these sciences should make philosophers “recollect” the *telos* of their own enterprise. The philosophical science thus envisaged aims, in turn, to rescue the existing sciences from their imperfection and to absorb them in its all-encompassing unity. What looks at first sight as a fragmented situation involving two distinct characters, namely science and philosophy, is actually nothing but a unitary phenomenon that becomes clear only under the heading of the teleology of reason underlying Western history. What we, in a somewhat empirical vein, call “philosophy” on the one hand and “science” on the other are not *en situation* with one another; they are both aspects of the absolute situation of philosophy properly conceived; and, when the obscurities surrounding them will be swept away, they will appear as moments of a unique universal *episteme*. This is, to be sure, a theme familiar to Husserl’s readers, but, as I will try to show in this book, it is also one that, accustomed as we are to the specialized character of

contemporary philosophical debates, we tend to leave too often in the background when discussing specific aspects of his thought as well as its present significance.

Within Husserl's project, natural science, in particular mathematical physics, acquires a fundamental significance for two reasons. First, mathematical physics provides a paradigmatic case of the way in which Husserl articulates transcendental phenomenology, ontology, empirical science, and metaphysics. Second, the "fatal" misunderstandings that throughout modernity have surrounded the mathematization of nature have given rise to an erroneous conception of nature and of the totality of the world, which, in turn, has made it impossible to frame correctly the essence of subjectivity, and, consequently, to develop philosophy as a rigorous science. The first point concerns the mathematical science of nature as a paradigmatic area in which transcendental phenomenology exerts its foundational function; the second concerns how erroneous philosophical conceptions of mathematical physics stand in the way of phenomenology and, thus, of the future metaphysics that should be built upon it. Therefore, Husserl's entire intellectual trajectory can be understood in light of the crucial relation between his conception of the nature of philosophy and the problem of the sense of nature as the object of mathematical science. What is at stake is not merely philosophy's capability to frame correctly nature and natural science, but also, and more importantly, the possibility for philosophy to unfold *its own* nature, its true essence as the universal science of being. This can be achieved only by rescuing nature from the erroneous philosophical conceptions that have characterized modern thought from the early modern period up to the contemporary age. *Philosophy's Nature* is a book about this crucial relation, exploring the way in which Husserl has shown that the fate of philosophy itself and our conception of nature are inseparable.

\*  
\*\*

This book, to state it more formally, is an investigation into the relations between natural science and metaphysics within Husserl's phenomenological philosophy. As such, it brings together in a single interpretative framework two thematic areas that past scholarship as well as the post-Husserlian phenomenological tradition have dealt with separately, and in the case of metaphysics, only marginally. A few remarks about how these two themes have been dealt with so far will help to clarify the aim of this work.

The history of the reception of Husserl's account of natural science in general and the exact sciences of nature in particular is interesting in its own right and constitutes an important strand in the vicissitudes of contemporary philosophy. As is well known, subsequent phenomenology has not taken up and further pursued Husserl's foundational



#### 4 Introduction and Plan of the Work

project; instead, it has often regarded the reflection on scientific knowledge as a secondary and derivative issue. Furthermore, from the 1950s onward, first in the English-speaking world and then, subsequently, in continental Europe, such reflection has been marked by the academic institutionalization of the philosophy of science as an autonomous discipline, largely contiguous to the analytic tradition, to its themes, methods, and conceptual vocabulary. Thus, the thematic focus on science has become, until recently, one of the hallmarks separating off the analytic from the continental tradition. This fact explains the fate of Husserl's account of natural science over the past seventy years. Husserl's readers from the continental tradition have produced a number of exegetical studies aimed at clarifying the phenomenological account of natural science *per se*. Most of these analyses have focused almost exclusively on Husserl's last work *The Crisis of European Sciences and Transcendental Phenomenology* (henceforth, *Krisis*), and, in particular, on the famous sections devoted to Galileo's mathematization of nature. The reason for this choice is that this theme is of paramount importance for elucidating the notion of *life-world* and the significance of history and of cultural critique in late Husserl. Thus, the significance of the mathematization of nature and the rise of modern physics has not been foregrounded within the overall development of Husserl's philosophy.<sup>3</sup>

Given the fundamental role that the scientific worldview based on physics plays in so many branches of analytic philosophy (from the philosophy of science and epistemology to the philosophy of mind and metaphysics), it is not surprising that those seeking to establish relations between phenomenology and the analytic tradition have often turned to Husserl's conception of nature and to his account of modern science. Since the late 1970s, there has been a growing body of literature in which scholars attempt to situate Husserl's account of natural science within the conceptual framework and the debates of contemporary philosophy of science, and to understand whether and to what extent it can provide the keys to tackling some of its central issues. Unsurprisingly, the problem of *scientific realism* has dominated the scene. As we shall see, the belief that Husserl intended to underplay the ontological value of physical theory is not only incorrect but extremely misleading, in that it is incompatible with the very nature of phenomenological philosophy. More importantly, the confrontation with these interpretations will be conducted in view of highlighting the radical difference separating phenomenological philosophy from contemporary philosophy of science. I will argue that, rather than seeking the aid of phenomenology in order to solve ready-made "philosophical problems," such as that of scientific realism, we should draw from phenomenology to question the methods and presuppositions of a specialized discipline such as the philosophy of science. This provides, in turn, an example of a critical analysis that, I believe, could be applied more broadly to other areas of contemporary philosophy.

If we now turn to the relation between phenomenology and metaphysics, we observe that the theme that Husserl's scholars have by far privileged is the problem of the so-called metaphysical neutrality of phenomenology. In other words, scholars have tried to determine whether Husserl's transcendental idealism should be considered a metaphysical thesis, or, more generally, whether it has metaphysical implications at all. What is characteristic of this debate, however, is that it focuses exclusively on metaphysics in one specific sense, i.e., the one whose central concern is the relation between world and subjectivity, which differs from Husserl's own mature notion of metaphysics. In other words, the theme of metaphysics has been approached largely from the outside, without reconstructing in detail the role of this concept in Husserl's thought. To be sure, as we shall see, the relation between transcendental idealism and the classical metaphysical questions concerning the ontological status of reality does play a fundamental role in Husserl's intellectual evolution. However, this role must be understood in light of Husserl's own use of the term "metaphysics", and first and foremost in relation to his theory of science.<sup>4</sup>

In this book, I will reassess these fundamental questions concerning Husserl's account of natural science by framing them against the background of Husserl's notion of philosophy as the universal science of being culminating in metaphysics. However, before turning to Husserl's writings, I will reconstruct some of the most influential conceptions of the relation between physical theory and reality within the German-speaking world between the second half of the 19th century and the beginning of the 20th century. These conceptions will then provide both the context surrounding Husserl's work and the targets of much of his philosophical critiques. Husserl's ideas will be explained and critically assessed in light of the confrontations with these positions. Husserl's most significant analyses concerning mathematical physics are contained in *Ideas I*, *Ideas II*, and the *Krisis*. The main difficulty in attempting to provide a comprehensive interpretation of these texts is attributable to the aforementioned double role that the reflection on nature and natural science plays in Husserl's thought. Both in *Ideas I* and in the *Krisis*, Husserl investigates the relation between the world of perception and its characterization in terms of physico-mathematical idealizations. The reason he does this, however, is to eliminate the misunderstandings concerning the relation between subjectivity and the world that stand in the way of transcendental phenomenology and motivate modern naturalism and skepticism. Only in *Ideas II* does Husserl sketch the stepwise constitution of material nature from perception to physical theory as a specific theme within the transcendental foundation of the sciences. Further difficulties arise due to the methodological status and incompleteness of such analyses. While *Ideas I* contains a fragment of a preliminary static eidetics of consciousness, in the *Krisis* we face a *sui generis* historical reconstruction of Galileo's

## 6 Introduction and Plan of the Work

mathematization of nature. Finally, even the constitutional analyses contained in *Ideas II* have a complex preliminary character inasmuch as they do not fully implement either the transcendental or the eidetic reduction. Thus, it is unsurprising that the mutual coherence of these texts often goes unnoticed, and that they have been read as if not incoherent (cf. Ingarden 1964) then at least discontinuous (cf. Rang 1990; Hardy 2013). I will argue conversely that these texts are unified and coherent vis-à-vis Husserl's conception of metaphysics as the ultimate science of reality. Although such an interpretation must acknowledge the novelty deriving from the late increasingly genetic and historical approach, it is also capable of demonstrating that Husserl never modified his mature view of the ontological value of physical theory. It will also become evident that only by considering the relation between natural and human sciences can one correctly read not only the *Krisis* but Husserl's earlier texts as well.

In conclusion, let us stress once more that this book is neither about Husserl's "philosophy of science," for, strictly speaking, there is no such thing, nor about how phenomenology can contribute to the philosophy of science. If anything, this book highlights that specialized philosophical disciplines such as the philosophy of science are themselves consequences of what Husserl calls the crisis of European culture, and that the lasting value of phenomenology consists in reminding us of the intrinsically unitary character of philosophy.

### Plan of the Work

#### *Chapter One: The Relation Between Physical Theory and Reality: Historical and Conceptual Material*

Rather than providing an exhaustive survey of the epistemological debates at the turn of the 19th century, this chapter introduces a number of conflicting influential conceptions of scientific knowledge that constitute explicit antagonists of Husserl's own position. At the same time, their contrast illustrates the state of crisis of the physical sciences stemming from the unclear ontological status of their object. The starting point is provided by Emil Du Bois-Reymond's claim that physics is necessarily unable to gain any insight into the essence of matter and force, and that, consequently, it amounts to a mere surrogate of knowledge devoid of metaphysical value. Both phenomenologists such as Ernst Mach and critical realists such as Carl Stumpf, Wilhelm Wundt, Oswald Külpe, and Max Planck rejected this skeptical stance, although from two opposite perspectives. Mach's phenomenism undercuts Du Bois-Reymond's *ignorabimus* by denouncing as "metaphysical mythology" the idea that the world has an essence lying beyond experience and by interpreting physical theory as a mere compendious summary of sensations. Critical realists, influenced by Hermann von Helmholtz's naturalistic neo-Kantianism, believed that physiology and psychophysics could ground

a form of indirect access to the external world. This chapter also mentions non-German-speaking authors such as Henri Poincaré and Pierre Duhem, whose views are conceptually relevant for the subsequent discussion of Husserl's views.

### ***Chapter Two: Husserl's Conception of Natural Science Between the Theory of Knowledge and Metaphysics***

This chapter reconstructs the evolution of Husserl's conception of the relation between the theory of knowledge, natural science, and metaphysics from the early 1890s to his *Ideas*. Four fundamental elements of continuity emerge in this complex evolution: (1) the inability of the empirical sciences, as they are *de facto*, to achieve ultimate knowledge of reality, (2) the explanation of this inability with reference to the uncritical acceptance of the natural conception of the world and of its metaphysical presuppositions, (3) the consequent need of metaphysical closure for the completion of such sciences, and (4) the ultimate grounding of such metaphysical closure in a theory of knowledge devoid of metaphysical presuppositions. This general scheme is already at work before the *Logical Investigations*, and this fact casts light on the much-discussed metaphysical neutrality of Husserl's first major work. Following a number of complex conceptual and terminological adjustments, Husserl realizes after the transcendental turn that the theory of knowledge grounded in phenomenology is not only necessary for the metaphysical completion of the sciences, but that, already by itself, it substitutes for the traditional metaphysical positions (such as idealism and realism) the elucidation of the sense of being of the entities belonging to all regions of reality. The different empirical sciences, once elucidated in the double a priori framework of transcendental phenomenology and of regional ontology, acquire the status of ultimate knowledge of reality, i.e., of metaphysics. Beyond metaphysics in this sense, there exists the possibility of a scientific investigation into the higher and ultimate problems pertaining to the meaning of human existence, the teleological sense of the world, and God as the source of such teleology.

### ***Chapter Three: Transcendental Consciousness and Nature***

Chapters 3 and 4 presuppose the general framework introduced in Chapter 2 and clarify the sense in which transcendental phenomenology makes possible the conversion of natural science into the metaphysics of nature. Chapter 3 contains a detailed analysis of the relation between the thing of perception and the thing of physics in *Ideas I*. In the "Consideration Fundamental to Phenomenology", Husserl discusses this problem in the context of the delimitation of the region of pure consciousness. This delimitation requires overcoming the misunderstandings about the relation between consciousness and nature stemming from a philosophical

## 8 *Introduction and Plan of the Work*

misappropriation of the natural attitude. In this chapter, I show that only by framing Husserl's discussion in §40 and §52 of *Ideas I* as a refutation of critical realism is it possible to interpret Husserl correctly. The famous thesis of the identity between the thing of physics and the thing of perception is discussed at length in light of the distinction between perception and idealization. Its analysis discloses the true object of physical theory, i.e., material nature as originally constituted in perception. I argue that the failure to correctly frame this distinction lies at the basis of the interpretations of these passages according to which Husserl is thought to be undermining the truth of physical theory and the legitimacy of postulating in principle unobservable entities. Subsequently, I review and criticize the interpretations of Husserl's account of physical theory developed in light of the contemporary debate on scientific realism, and I argue that they all stem from the inability to grasp the way in which phenomenology renders thematic the very idea of the world. Finally, I propose a general account of the relation between transcendental phenomenology and existence claims, highlighting the gulf that separates phenomenology from the philosophy of science.

### *Chapter Four: The Transcendental Constitution of Material Nature*

*Ideas II* is the only text in which Husserl outlines the stepwise constitution of material nature from the lower correlates of perception to the nature of mathematical physics. In this chapter, I reconstruct this constitution, stressing the role of the living body in the transition from the correlates of perception to physical idealizations. The subjectivity of such correlates to the living body highlighted by perceptual anomalies and by the intrinsic relativity of perceptual normality motivates the constitution of nature as described by physical theory. This constitution requires first the introduction of an objective, non-intuitive, and yet non-idealized space; subsequently, the idealization of space and time; and, finally, the idealization of all causal properties of the perceived objects. I give an account of why the resulting physical objectivity is ultimate and admits no further constitutive layers beyond it. This conclusion is necessary to elucidate the sense in which the theory of constitution bestows on natural science the status of ultimate knowledge of reality, i.e., metaphysics. Subsequently, I criticize Bernhard Rang's thesis that *Ideas II* presents an account of mathematical physics incompatible with Husserl's results in *Ideas I* and in the *Krisis*. Rang is also wrong in thinking that this is due to Helmholtz's influence on Husserl at the time he was working on this text. I then turn to the problem of the transcendental status of the constitutive analyses of *Ideas II*, and I respond to the objections formulated by Roman Ingarden concerning the compatibility of these analyses with Husserl's transcendental approach.

In so doing, I clarify the relation between transcendental phenomenology and empirical knowledge, the way in which the latter can be accommodated within the former, and the relation between the naturalistic and the transcendental attitude. Based on the results of Chapters 2, 3, and 4, I formulate a phenomenological critique of the remaining epistemological positions outlined in Chapter 1: Du Bois-Reymond's skepticism and Mach's phenomenalism. Finally, I outline some of the questions that quantum mechanics and the theory of relativity raise for Husserl's theory of science.

### ***Chapter Five: Life-World, Natural Science, and the Crisis of Philosophy***

This chapter is entirely devoted to an interpretation of the *Krisis* revolving around the concept of metaphysics. In particular, I develop an original definition of the notion of the crisis of the European sciences, a detailed reading of the section on Galileo's mathematization of nature that is fully consistent with Husserl's previous analyses, and a defense of the coherence of the notion of the life-world and of its relation with the world of scientific truth. I also show that, in order to understand the advances that the *Krisis* makes with respect to Husserl's analysis of mathematical physics in *Ideas II* and *Ideas III*, it is necessary to take into account the preeminence of the personalistic attitude over the naturalistic attitude, and of the world of spirit over nature. I suggest that Husserl's historical considerations about Galileo's mathematization of nature can be supplemented by a constitutive analysis highlighting how the life-world contains the world of scientific truth as the correlate of an infinite historical process. The crisis of the European sciences appears as the inevitable upshot of the obscurity concerning their own scientificity, which is nothing other than Husserl's last attempt to characterize the drama of their incompleteness. I distinguish the crisis of the European sciences from their loss of significance for life and connect these two phenomena with the failure to develop the two aforementioned layers of metaphysics. This clarifies the relation between the notion of the life-world and Husserl's attempt to anchor metaphysics in phenomenology.

### **Notes**

1. A few lines of this Introduction are reprinted in the entry "Phenomenology and Philosophy of Science" of the *Routledge Handbook of Phenomenology and Phenomenological Philosophy*.
2. Hua XXV, p. 41.
3. Notable exceptions in this respect are the works of Arold Gurwitsch (1974), Elizabeth Ströker (1987, 1988), Bernhard Rang (1973, 1990), and François De Gandt (2004), which have conducted extensive, though not exhaustive, explorations of the theme of natural science within Husserl's corpus. Rang's

## 10 Introduction and Plan of the Work

1973 book *Kausalität und Motivation* and his 1990 book *Husserl's Phänomenologie der materiellen Natur* have focused on Husserl's conception of nature and natural science in *Ideas I* and *Ideas II*, without however providing any detailed analyses of Husserl's earlier and later contributions to these subjects, namely in the *Krisis*. De Gandt's 2004 book *Husserl et Galilée*, conversely, is mainly devoted to the *Krisis* and to Husserl's interpretation of the Galilean "revolution."

4. More recently, Bancalari (2010), Tengelyi (2014), Trizio (2017, 2018), and De Santis (2018) have contributed to the exploration of Husserl's own notion of the metaphysics of facticity and its relation with transcendental idealism.

## Bibliography

- Bancalari, S. (2010). Eidos versus intersoggettività: una prospettiva husserliana sull'impossibile. *Archivio di Filosofia*, 78(1), pp. 229–238.
- De Gandt, F. (2004). *Husserl et Galilée*. Paris: Vrin.
- De Santis, D. (2018). "Metaphysische Ergebnisse": Phenomenology and metaphysics in Edmund Husserl's Cartesianische Meditationen (§60). Attempt at commentary. *Husserl Studies*, 34(1), pp. 63–83.
- Gurwitsch, A. (1974). *Phenomenology and the Theory of Science*. Evanston, IL: Northwestern University Press.
- Hardy, L. (2013). *Nature's Suit*. Athens: Ohio University Press.
- Hua XXV. Husserl, E. (1987). *Aufsätze und Vorträge (1911–1921)*. Dordrecht: Martinus Nijhoff.
- Ingarden, R. (1964). Husserls Betrachtungen zur Konstitution des Physikalischen Dinges. *Archives de philosophie*, 27, pp. 356–407.
- Rang, B. (1973). *Kausalität und Motivation*. The Hague: Martinus Nijhoff, 1973.
- Rang, B. (1990). *Husserl's Phänomenologie der materiellen Natur*. Frankfurt am Main: Klostermann.
- Ströker, E. (1987). *The Husserlian Foundation of Science*. Washington, DC: University Press of America, 1987.
- Ströker, E. (1988). Husserl and philosophy of science. *Journal of the British Society for Phenomenology*, 19(3), pp. 221–234.
- Tengelyi, L. (2014). *Welt und Unendlichkeit*. Freiburg and München: Verlag Karl Alber.
- Trizio, E. (2017). Husserl's early concept of metaphysics as the ultimate science of reality. *Phainomenon*, 26, pp. 37–68.
- Trizio, E. (2018). Il significato metafisico della teoria fenomenologica della conoscenza. *Bollettino Filosofico*, 33(1), pp. 160–174.

# 1 The Relation Between Physical Theory and Reality

## Historical and Conceptual Material

### §1. The Problem of the Object of Physical Theory at the Time of the Decline of the Classical Mechanistic Worldview

The three decades preceding the end of the 19th century was a time of great scientific upheavals marked by the demise of the mechanistic worldview. If we tend to underestimate its significance, this is largely because of the shadow that the subsequent appearance of quantum mechanics and the theory of relativity has cast over it. It was also a time that saw the emergence of a vast epistemological debate about the very essence of the mathematical science of nature, which was destined to continue along similar lines well into the 20th century. The title of Pierre Duhem's famous 1906 book, *La théorie physique – son objet sa structure*, perfectly captures the main point at issue in this debate. What meaningful task can be assigned to physical theory from the point of view of logic and the theory of knowledge? In other words, what is its real object? What is physical theory ultimately *about*? Furthermore, with what conceptual material is a physical theory to be built? What unity must pertain to such material? In short, what is the *structure* of physical theory? Ernst Cassirer, at the beginning of a detailed reconstruction of some of the predominant epistemological currents of the time, stresses the exceptional character of this controversy:

In no earlier period do we meet such extensive argument over the very conception of physics, and in none is the debate so acrimonious. Even classical physics did not have this conception ready at hand; on the contrary, one of its first tasks had been to create the concept and then to defend it in constant battle with the Aristotelian-scholastic view. But this conflict was waged on a compact and united front in the conviction that reason and experience would be able to penetrate the nature of reality and progressively reveal it. The *ontological* significance of the physical theories was never seriously challenged, however widely these differed from each other in content.



## 12 *The Relation Between Theory and Reality*

In the nineteenth century, however, there came a sudden change. The realism of natural science was supplanted by a phenomenalism that disputed not only the possible existence of a solution but even the meaning of the problems that had been set up by physical thought. When Mach or Planck, Boltzmann or Ostwald, Poincaré or Duhem are asked what a physical theory is and what it can accomplish we receive not only different but contradictory answers, and it is clear that we are witnessing more than a change in the purpose and intent of the investigation.<sup>1</sup>

The authors mentioned by Cassirer were nothing like today's professional philosophers of science, for they were all practicing scientists who made important contributions to their fields. As we shall see, in their work the epistemological and ontological reflections on science accompany specific choices in the elaboration and formulation of scientific theories and, thus, are by no means methodologically neutral. Every reconstruction of this debate must begin by recalling that the main coordinates of the "realism" Cassirer refers to point to the task assigned to physical theory between the end of the 18th and the first half of the 19th century. It was the time of the triumphant mechanistic, Newtonian worldview, heralded by Pierre-Simon Laplace's famous mental experiment.<sup>2</sup> As for the "phenomenalism" that Cassirer opposes to realism, we will soon have the opportunity to discuss it at length. Laplace's mechanistic and deterministic worldview, which he deemed to follow from the spectacular predictive success of Newtonian astronomy, epitomizes the philosophy underlying most mathematical science of the time, which was being analytically formulated in the works of Joseph-Louis Lagrange. According to Laplace, the difference between the behavior of planets and comets and that of the atoms and molecules making up material objects lies only in our ignorance concerning the latter.<sup>3</sup> Only our limited capacity to determine the physical variables involved in such complex systems prevents us from obtaining the same kind of predictive power enjoyed by astronomy. In sum, a material object is but an extremely complex system of atoms and molecules that evolves according to the differential equations governing Newtonian, or central, forces. Thus, in principle, one single formula, a "world formula," could comprise past, present, and future states of the entire universe. Such a conception completely predetermined the task of physical theory in a thoroughly *realistic* way. In order to understand the inner structure of all phenomena, whether magnetic, electrical, optical, thermic, or even chemical, one had, in principle, to aim at an explanation in mechanical terms. Understandably, this research program exerted a powerful influence across all the special sciences as well as metaphysics, and it led to a vast materialistic movement in philosophy and to a likewise vast debate over materialism of dubious philosophical value.<sup>4</sup> Nevertheless, the debates over the intrinsic limitations of the mechanical

worldview, and its demise within scientific research itself, deserve our attention in view of the characterization of the controversy concerning the ontological significance of physical theory.

## §2. The Problem of the Limits of Physical Knowledge: Du Bois-Reymond

The *locus classicus* of the debate about the intrinsic limitations of traditional mechanism is the famous lecture that the German physiologist Emil Du Bois-Reymond delivered at the 45th conference of the German natural scientists and doctors, which took place in Leipzig in 1872: *Über die Grenze des Naturerkennens*. Nothing illustrates Du Bois-Reymond's faith in the universal validity of mechanical explanations based on the notions of atom and force better than the fact that devising such explanations for all changes taking place in the world of physical bodies amounts, for him, to the very definition of physical knowledge. In other words, according to him, understanding the material world (including the material side of all forms of life) *means* devising explanations in terms of movements of atoms interacting through central forces.<sup>5</sup> In this lecture, such an admittedly dogmatic characterization of physical knowledge is introduced in order to highlight its intrinsic limitations. To illustrate them, Du Bois-Reymond resorts to a kind of negative version of Laplace's thought experiment: if the latter expresses the ideal of a fully developed, infinitely remote, and complete physical science, what would remain inaccessible to Laplace's hypothetical "spirit" would also lie *forever* beyond the reach of human knowledge. In this lecture, the limits of physical knowledge amount to the following. First, no physical theory can enable us to know the essence of matter and force; that is, the essence of the material world is beyond our reach. Second, even an ideally complete physical knowledge (or, as Du Bois-Reymond says, an "astronomical knowledge"<sup>6</sup>) of the nervous system would never yield an explanation of why mental life arises out of it, not even in the case of the simplest sensation occurring in a primitive life form.<sup>7</sup> The justification of these claims requires a brief discussion.

To start with, one should not miss the radicalism of the first claim, which according to Du Bois-Reymond implies that the knowledge of nature afforded by mechanics satisfies our demand for causal explanation only provisionally and that, at bottom, *it is no knowledge at all*.<sup>8</sup> Du Bois-Reymond's argument rests on the distinction between "physical" and "philosophical" atoms.<sup>9</sup> By the former, he means a body whose size is negligible with respect to ordinary bodies, but is, in spite of its name, still divisible. To such atoms, natural scientists ascribe states of movement and other mechanical properties so that a large number of them explain the observable behavior of macroscopic bodies. However, according to Du Bois-Reymond, atoms thus understood are only *fictions*,

the usefulness of which varies according to the specific field of investigation.<sup>10</sup> Du Bois-Reymond does not explicitly say why they are only fictions. Presumably, the reason is that they are not even meant to be the ultimate components of reality, but only conceptual units allowing a certain convenient, and by no means uniquely determined, decomposition of observable objects. Furthermore, their divisibility hints at the fact that they are but “very small pieces” of macroscopic bodies, and accepting their explanatory function does not commit the scientist to any conception of the essence of matter, not even to a choice between the corpuscularist and the continuist ones. The “philosophical atom,” on the other hand, is “an allegedly indivisible mass of an inert and ineffective substrate, from which forces acting at a distance through the empty space emanate.”<sup>11</sup> This atom, however, is an “*Unding*,” an absurd non-entity, and the attempts to develop a clear conception of it lead to the contradictions of classical corpuscularist philosophy. If an atom occupies a tiny portion of space, why is it not further divisible? If it is infinitely hard, so that it can fill up space, and thus it reacts to any force trying to compress it, how can it be an effect-less substrate? Moreover, if it has no extension at all, if the substrate is identified with the middle point of central forces, how can it fill up space? And what is left as the source of the central forces?<sup>12</sup> Other well-known problems affect the notion of a force acting at a distance through empty space already discussed by Leibniz.<sup>13</sup> In sum, because physical explanation rests on concepts (atom and force) that either stand for useful fictions or vaguely designate contradictory philosophical concepts, it is not apt to provide a satisfactory picture of the essence of matter. Du Bois-Reymond also provides an account of the sources of these unavoidable contradictions:

They are rooted in our inability to represent anything other than something experienced either with the external senses or with the internal sense. In the effort to fragment the corporeal world, we start from the divisibility of matter, because, visibly, parts are something simpler and more fundamental than the whole. If we proceed in thought further and further with the division of matter, we remain in the intuition on the path allowed to us, and we feel unhindered in our thinking. We take no step towards the understanding of the material object [*Ding*], because, in fact, we represent in the realm of the small and invisible only what appears in the realm of the large and visible. We arrive, thus, at the concept of the physical atom. But if now, anywhere, we arbitrarily halt the division, we stop at alleged philosophical atoms that should be indivisible any further, perfectly hard, and yet in themselves effect-less, and only bearing central forces: thus, we require that a matter, which we conceive by means of the image of matter as we manipulate it, unfolds new, fundamental properties explaining its own essence, and this without introducing any new

principle. Thus, we make the mistake that manifests itself through the previously exposed contradictions.<sup>14</sup>

In light of this passage, Du Bois-Reymond's conclusions appear to rest on an epistemological thesis according to which our capacity to meaningfully represent anything at all cannot transgress the boundaries set by perception (whether internal or external) and imagination simply reproduces physical objects as perceived. For the moment, let us set aside the problem, which Du Bois-Reymond here does not discuss, that imagination is also bound to reproduce the qualitative character of perceived objects. Let us also postpone a more detailed analysis of this argument until Chapter 4, §7, when it will be possible to analyze it from the standpoint of phenomenology.

According to Du Bois-Reymond, the second limitation of physical knowledge can be exhibited even more plainly. Even if we possessed a perfect astronomical knowledge of all material components of the human brain, or of the simplest nervous system of an animal, we would not be in the position to understand how the simplest sensation can arise from it. We would have knowledge of matter and motion only.<sup>15</sup> The results of much of modern metaphysics from Descartes to Leibniz attest to this impossibility and to the multiple problems connected to it, such as those pertaining to mind-body causation.<sup>16</sup>

The kind of "astronomical" exact knowledge of physical bodies and processes available to Laplace's spirit, thanks to its "world formula,"<sup>17</sup> will never cross these boundaries, and neither, a fortiori, will ours. Natural science will never yield more than a mechanical pseudo-explanation of physical processes on the one hand and knowledge of the correlation between mental events and their material conditions on the other. The consequences that Du Bois-Reymond draws from this analysis, which culminates with the famous *ignorabimus* closing the lecture,<sup>18</sup> completely reverses the epistemic optimism of the "mechanical philosophy" of the past: natural knowledge offers only a "surrogate of an explanation."<sup>19</sup> This conclusion still holds, according to Du Bois-Reymond, notwithstanding the fact that we can go, in a sense, beyond perception, and persuade ourselves that matter does not have the secondary qualities we experience in ordinary objects. That much can be proved scientifically, but nothing more.<sup>20</sup>

Du Bois-Reymond's *ignorabimus* became a common reference in the scientific and philosophical discussions of the time, and remained the object of heated debates even when its fundamental mechanistic premise began to falter because of the development of physical theory itself.<sup>21</sup> Two main fields of investigation gradually led to the definitive overcoming of the methodological and ontological privilege of mechanical explanation: electromagnetism and thermodynamics. As for the former, while James Clerk Maxwell still suggested a mechanical model underlying his field

equations, a model grounding electromagnetism on a material medium, i.e., the ether, Heinrich Hertz developed a wave-theory standing on its own, without mechanical representations as its basis. On the other hand, thermodynamics raised the great challenge of explaining the phenomenon of irreversibility. The attention was soon polarized by the struggle between mechanistic atomism and a rival account of reality “energetism” of which a sort of manifesto was read by the chemist Wilhelm Ostwald at the conference of the German natural scientists and doctors that took place in Lübeck in 1895: *Die Überwindung des wissenschaftlichen Materialismus*. The doctrine, which was first stated as a physical hypothesis and subsequently developed by Ostwald into a general metaphysical point of view, was meant to replace the concepts of atom and force as the unifying elements of physical theory with that of energy. The title of the conference is significant by itself, and so is the first paragraph, which contains the definition of *scientific materialism*, i.e., the thesis that “things are composed of atoms in a state of motion, and that the atoms and the *forces* acting among them are the ultimate realities of which the individual appearances consist,”<sup>22</sup> along with the claim that it enjoys a virtually absolute consensus within the scientific community. Ostwald was persuaded that Du Bois-Reymond’s *ignorabimus* was only a consequence of his mechanistic premises, and that, once he abandoned the latter, the former would go by the board, too.<sup>23</sup> In other words, only the flaws inherent in the atomistic worldview are responsible for the alleged insoluble riddles of the universe. Even more important for the history of the physics of subsequent years is the claim that scientists ought to give up the demand for the “intuitive” physical explanations afforded by mechanical models and ultimately derived from perception and imagination. While stressing this point, Ostwald explains his own conception of the task of natural science in general (and, one can infer, of physical and chemical theory in particular):

You shall not make for yourself an image nor a resemblance! Our task is not to see the world in a more or less clouded or distorted mirror, but so directly as it will be allowed to us by the constitution of our mind. The task of natural science consists in putting realities in mutual relation by means of attestable and measurable quantities in such a way that when the ones are given the others can be inferred, and it cannot be accomplished by laying underneath any hypothetical image, but only by proving reciprocal relations of dependence of measurable quantities.<sup>24</sup>

What is at stake is the possibility of the language of physical theory, i.e., mathematics, the language allowing the construction of relations among measurable quantities, to break free from the chains of our spatial intuition. We can appreciate to what extent this position conflicts with Du

Bois-Reymond's attempt to ground the limitation of physical nature in the rootedness of our representation of matter in perception and in imagination. This theme will play an important role not only in the famous debates among the fathers of quantum mechanics, but also, in a wholly different way, in Husserl's account of physical knowledge.

In conclusion, in those years, the mechanistic worldview that Du Bois-Reymond identified with physical knowledge as such, as well as the resulting task and method assigned to physical theory, were challenged both on broad epistemological and strictly scientific grounds. This situation provided the background for the redefinition of the very object of physical theory proposed by various forms of extreme positivism, among which by far the most influential was that of Ernst Mach.

### §3. Ernst Mach's Phenomenalism and the Elimination of the Limits of Physical Knowledge

Not only the claim of knowing something but also the contrary claim of ignoring something comes with a price, especially if what is thereby meant is that there are depths of reality that human knowledge will never be able to probe. It was Mach's firm belief that all apparent riddles of natural science, all allegedly definitive *ignorabimus*, rested on the metaphysical legacy still polluting the rationality of scientific method. Such metaphysical prejudices made possible both ungrounded leaps into hyperphysical knowledge (e.g., Haeckel's theory of the *Atomseele*) and the only apparently wise and modest claims that there are intrinsic limitations to what the human mind is capable of understanding (e.g., Du Bois-Reymond's *ignorabimus*).

It is convenient, when presenting the essential features of Mach's positivism, to begin with his critique of the privileged status that the tradition has bestowed upon mechanics. In his 1893 work *The Science of Mechanics: A Critical and Historical Account of Its Development*, Mach tried to undermine the classical thesis that mechanics must provide the foundations for all other physical disciplines. According to Mach, such a mistaken conception has gone hand in hand with a mechanistic worldview that no scientific results have ever supported or required. The damage produced by the mechanistic worldview has not been limited to the *interpretation* of physical theory and its ontological value, but has affected its actual historical development. It has motivated, for instance, formulations of the laws governing thermodynamic phenomena or of the theory of electricity, which were based on hypotheses concerning unobservable mechanical fluids. According to Mach, instead, one can reformulate all physical knowledge by eschewing such hypotheses. Nothing more is needed than systems of differential equations whose variables express measurable quantities, and whose solutions represent the evolution over time of these quantities.

## 18 *The Relation Between Theory and Reality*

Physical theory must therefore be *purged* of all theoretical constructs, all hypotheses concerning unobservable entities or processes, and construed as an abstract mathematical structure expressing nothing but the observable facts and their relations:

If we work over in a similar manner the entire domain of physics, we shall restrict ourselves wholly to the quantitative conceptual expression of actual facts. All superfluous and futile notions are eliminated, and the imaginary problems to which they have given rise forestalled.<sup>25</sup>

Mechanics, *in primis*, must be developed according to this methodology. There are no purely mechanical phenomena, only mechanical *aspects* of physical phenomena, which all have also thermic properties, electric properties, optical properties, etc. Thus, it is absurd to believe that theoretical instruments such as the concepts of atoms and force, which can only exert a temporary heuristic function, stand for mind-independent, ultimate, *purely mechanical* components of reality. This belief produces pseudo-problems such as those stated by Du Bois-Reymond concerning the essence of matter and the relation between matter and sensation.<sup>26</sup>

Such a conception of the object of scientific knowledge was based on an extreme form of empiricism, the central thesis of which Mach states with great clarity:

The world consists of colors, sounds, temperatures, pressures, spaces, times, and so forth, which now we shall not call sensations, nor phenomena, because in either term an arbitrary, one-sided theory is embodied, but simply *elements*. The fixing of the flux of these elements, whether mediately or immediately, is the real object of physical research. As long as, neglecting our own body, we employ ourselves with the interdependence of those groups of elements which, including men and animals, make up *foreign* bodies, we are physicists. For example, we investigate the change of the red color of a body as produced by a change of illumination. But the moment we consider the special influence on the red of the elements constituting our body, outlined by the well-known perspective with head invisible, we are at work in the domain of physiological psychology. We close our eyes, and the red together with the whole visible world disappears. There exists, thus, in the perspective field of every sense a portion which exercises on all the rest a different and more powerful influence than the rest upon one another. With this, however, all is said. In the light of this remark, we call *all* elements, in so far as we regard them as dependent on this special part (our body), *sensations*. That the world is our sensation, in this sense, cannot be questioned.<sup>27</sup>

The facts that science, whether physics or physiological psychology, investigates amount to nothing but complexes and lawful successions of elements appropriately considered. Such an extreme phenomenalism was bound to meet fierce resistance. Mach was indeed often accused of relapsing into a form of Berkeleyan idealism, to the point that he explicitly denied any proximity between his thought and Berkeley's spiritualistic metaphysics, which rested on the divine causation of ideas in the mind.<sup>28</sup> One can note that he could have distanced himself from classical immaterialism more radically by pointing out that Berkeley retains the idea of substance as the substrate in which ideas inhere, while, following Hume, Mach reduces both material bodies and the subject to so many associative complexes of actual and potential elements. Furthermore, as we read in the aforementioned quotation, Mach's elements are neutral with respect to their mental or physical nature. They are components of what we term "bodies," or "phenomena," when their mutual relation is considered; they are called "sensations" when they are regarded in their dependency from the perceiving body.<sup>29</sup> In the first case, they constitute the object-domain of physics, in the second that of physiological psychology.<sup>30</sup> This amounts, in Mach's view, to a decisive innovation with respect to traditional empiricism.<sup>31</sup>

Given that physical theory cannot aim at going beyond observable facts by means of hypotheses (there literally is nowhere to go . . .), its *true* objects<sup>32</sup> are not atoms and forces, but rather the elements considered as physical phenomena. One must therefore reinterpret the entire edifice of scientific knowledge as ultimately consisting of claims *about* physical phenomena or sensations. At this point, Mach's empiricism manifests its markedly naturalistic character. He claims that the entire conceptual form that scientific knowledge bestows upon sensations stems from the "principle of economy," which in turn governs the cognitive functions of all animal species, including humankind. *Qua* animals, we are oriented in the world by experience and in view of certain goals that maximize our chances of survival. Crucial to such survival is the necessity to know in advance the future course of events. In order to be successful in this endeavor, we develop expectations based on past experience, in the classical empiricist language, based on constant conjunction, or association. The great problem of life, on this account, consists in achieving cognitive mastery over experience *with the least expenditure of energy*. It is easy to acknowledge that the very development of language already affords a great economy, for it allows encapsulating and communicating past experience. This is particularly evident in the use of concepts, which pick a large class of "similar" objects and allow their compendious designation. Furthermore, some fundamental notions appear to be particularly useful by virtue of the economy of experience they realize. Such is the case, for instance, with our ordinary notion of "body," which we build



## 20 *The Relation Between Theory and Reality*

by selecting certain more permanent features and investing them with the status of a substance on which other temporary properties are added. However, the strategy of finding ways to encompass an immense amount of experiences by means of a simple mental construct has an undesired consequence, namely, that we are almost unavoidably misled into asking what the *intrinsic features* of bodies are:

It thus comes to pass that we form the notion of a substance distinct from its attributes, of a thing-in-itself whilst our sensations are regarded merely as symbols or indications of the properties of this thing-in-itself. But it would be much better to say that bodies or things are compendious mental symbols for groups of sensations-symbols that do not exist outside of thought. Thus, the merchant regards the labels of his boxes merely as indexes of their contents, and not the contrary. He invests their contents, not their labels, with real value.<sup>33</sup>

Similar considerations apply to all fundamental notions that we introduce to give an order to the world of sensations, including those principles that Kant deemed rooted in the understanding, such as that according to which like circumstances are followed by like effects, which allows the application of causal reasoning.<sup>34</sup> The notions of cause and effect too have a merely “economical function,” and our tendency to employ them is rooted in the evolution of our species.<sup>35</sup> To express ourselves in Husserl’s language, Mach was trying to derive all fundamental a priori concepts and presuppositions of science, both the formal-ontological ones, such as the difference between particulars and universals or the notion of plurality and number, and the material-ontological ones, such as space, time, the notion of the corporeal body, and the principle of causality, from associative functions operating on the raw material of sensation. Furthermore, in a thoroughly naturalistic way, Mach sees this ordering activity itself as effected by a subject apperceived as a biological system and driven by the need to anticipate future events with the least expenditure of energy.<sup>36</sup>

According to Mach, the economical character of knowledge stands out even more clearly if we consider the higher formations of scientific thought in mathematics, physics, and chemistry. Mathematics is but an economy of counting, chemistry an economy based on the notion of element, and physics on that of law. This leads to the project of a purely descriptive physics, purged of all metaphysical postulations. A physical law such as Galileo’s law of descent amounts to nothing but a compendious formulation of all possible trajectories of free-falling bodies. Each trajectory, further, can be considered as a compact mathematical expression for an in-principle infinite table pairing instants of time with positions and velocities. The laws of physics, thus, realize a compact and “economic”

summary of an infinite number of facts, which our limited mind would be otherwise unable to retain or recall whenever necessary.<sup>37</sup> Moving upward on the scale of physical abstractions, we encounter notions so often used in physical and chemical theory, such as those of atom and molecule. Now, in Mach's view, the belief that such concepts provide insights into the intrinsic nature of bodies, of material substances, was an old metaphysical mistake. But, when we realize that bodies are only mental symbols for complexes of sensations-symbols, we eradicate such mistakes for good. The use of the concepts of atom and molecule retain a certain usefulness only insofar as they contribute to the formulation of physical laws, which are the real bearers of valuable, genuine information about the flow of sensations. Thus, Mach reduces concepts such as atom and molecule to nothing but *provisional devices* serving the purpose of scientific research, which consists in discovering "the equations which subsist between the elements of phenomena."<sup>38</sup> Such concepts are, for Mach, similar to the segments that mathematicians artificially introduce to fragment a mathematical curve in order to find its equation, i.e., they are only temporary fictions that will be removed at a later stage.<sup>39</sup>

This ontological devaluation of physical theory goes so far as to brand the belief in the real existence of atoms and molecules as "mechanical mythology" substituted for "the old animistic or metaphysical scheme."<sup>40</sup> As is to be expected, such a restrictive view of the object of physical theory could not fail to encounter a fierce opposition among all realist-inclined minds.<sup>41</sup>

#### §4. Hermann Von Helmholtz, Critical Realism, and the Shifting Limits of Physical Knowledge

Since Locke's introduction of the distinction between primary and secondary properties, no epistemological reflection leaning towards realism can escape the challenge of clarifying the status of physical knowledge on the basis of an account of *the relation between perception and reality*. The family of positions known under the name of *critical realism* or *natural-scientific realism* (*kritischer Realismus* or *naturwissenschaftlicher Realismus*) is no exception in this respect. It is the merit of the German scholar Bernhard Rang to have attracted the attention of Husserl's readers on the relation between his thought and this vast epistemological movement, which developed in Germany under the influence of Hermann von Helmholtz's so-called physiological neo-Kantianism and which left an important legacy for the 20th century. Its other most significant figures were the philosophers Carl Stumpf, Wilhelm Wundt, and Oswald Külpe, and the physicists Ludwig Boltzmann and Max Planck.<sup>42</sup> In this section, I will focus primarily on outlining the positions of Helmholtz and Planck – insofar as they are, respectively, the eminent predecessor of this epistemological approach and probably the most well known among

## 22 *The Relation Between Theory and Reality*

its representatives to have voiced the scientists' widespread rejection of Mach's phenomenalism – and only briefly mention other authors who presented similar views.

As Rang rightly stresses, the starting point of these philosophical positions consists in the “radical separation between the world of the senses and the real world.”<sup>43</sup> Taking up (and, in some respects, radicalizing) Locke's point of view, these thinkers believe that the content of our perceptions does not faithfully mirror reality and consists instead of a complex system of signs produced in our mind by external stimuli. The way the world appears to us is dependent upon the physiological constitution of our species, as the physiology of sense organs itself confirms. Perceived determinations are, therefore, subjective and caused by the real world, which is not itself directly given in perception. According to Helmholtz, since we do not directly perceive the objects of the external world, but only their effects on our nervous systems, each perception involves an inference to the external cause of such effects.<sup>44</sup> Thus, the perception of, say, a table is a subjective construct produced by our brain, which we interpret (presumably in an instinctive and unconscious way) as corresponding to an external cause that is not itself given to us.<sup>45</sup>

The problem of determining the task of physical theory on the basis of such an account of the relation between perception and reality was not simple, especially for those who did not intend to give up the legacy of mechanical atomism under the attack of radical empiricists such as Mach and Avenarius. The question, as Rang says, is the following: “Do atoms really exist, or is the representation of an atomic world underlying the world of senses only a methodological instrument for an ‘economical’ description, as simple as possible, of the perceivable natural appearances?”<sup>46</sup> It is of course not a new question at all, but one that is interesting to situate within the epistemological discussion of the time. The expression “critical realist” contains the very tension that these thinkers set out to resolve: *qua* realists, they believed that the task of physics consists in knowing the real world; *qua* “critical” as opposed to “naïve”<sup>47</sup> realists, they claimed that we do not have any direct access to the real world, and that, therefore, only a *critical* interpretation of our representations based on the experimental results of physiology can single out the genuine cognitive content of our theories. In this respect, Helmholtz's position, which developed before Mach's and exerted a far-reaching influence over many philosophers and scientists, is particularly interesting.

In an address delivered in Berlin in 1878, *The Facts in Perception*,<sup>48</sup> Helmholtz characterizes the contribution of natural science to the problem of knowledge as follows: “[Natural science] seeks to separate off that which is definition, symbolism, representational form or hypothesis, in order to have left over unalloyed what belongs to the world of actuality whose laws it seeks.”<sup>49</sup> Accordingly, Locke's distinction between

primary and secondary properties can be reformulated and defended on the grounds of experimental psychophysical considerations, which show that the difference between completely different sensations “does not depend, in any manner whatsoever, upon the kind of external impression whereby the sensation is excited, but is determined alone and exclusively by the sensory nerve upon which the impression impinges.”<sup>50</sup> For instance, the excitation of the optic nerve by means of light, electric current, or even pressure on the eyeball always produces light sensations. Conversely, the same external stimuli produce completely different reactions in different sense organs, as evidenced by the fact that “the same aether vibrations as are felt by the eye as light are felt by the skin as heat.”<sup>51</sup> The conclusion of these experimental facts is that sensations are not images of what exists in the external world, but only symbols or signs, which is, to be sure, a reformulation of claims already made by Descartes and Locke. Although our sensations are determined by the structures of our sense organs and do not in any way resemble the external world, it remains true that “like objects exerting an influence under like circumstances evoke like signs” and that “therefore unlike signs always correspond to unlike influences.”<sup>52</sup> If the scientific study of perception, then, seals the fate of any naïve realistic stance about the similarity between the world as we perceive it and the real world, this principle allows us to draw the optimistic inference that we can attain “an image of lawfulness in the processes of the actual world.”<sup>53</sup> This means that the regulated course of our experiences can correspond to a regulated series of real events in the external world, and that, rather than just a sign, a law that we formulate on the basis of our experience can be an *image* of a real law of nature.<sup>54</sup> Such lawfulness is the most reliable component of our knowledge of the external world, while our view of the substances that make up the world, which would be, in principle, the ultimate bearers of the laws of nature, is bound to remain “problematic.”<sup>55</sup> In short, as Ranke points out, Helmholtz’s position rested on two fundamental claims: first, that our perception consists of signs of the real bearers of natural laws, and, second, that there is a *constancy* in the way in which external objects produce perceptual signs in us. These two assumptions jointly imply that the laws governing what manifests itself in perception are not just signs but images of the laws that hold in the real world, the bearers of which are known to us only through signs. Rank rightly noted that, according to this point of view, there is “an *isomorphism* between the *ordering according to laws* of both worlds, and in this very isomorphism consists the new meaning of the concept of image [*Abbild*].”<sup>56</sup> Accordingly, one can claim both that external realities exist and that the laws that we develop on the basis of our theoretical concepts, such as atoms and molecules, give us a correct representation of the laws governing the behavior of external objects. However, we can affirm neither that atoms and molecules really exist nor, a fortiori, that

we can know the inner structure of matter. The only knowledge of the external world that physical theory affords is an indirect representation of its laws.<sup>57</sup> In this way, while physical theory is not reduced to a mere instrument of predictions, as Du Bois-Reymond claimed, it remains unable to provide knowledge about the essence of the material world.<sup>58</sup> It is also important to stress that this pessimistic conclusion is not derived from the contingent limitations of the mechanistic worldview, which, as we have seen, Du Bois-Reymond rather dogmatically deemed to be the only valid worldview.

Helmholtz acknowledges that a realism that rests on experimental facts concerning perception is hypothetical in character and faces the challenge of a metaphysical position such as subjective idealism, which he believes to be in principle impossible to refute.<sup>59</sup> Indeed, Helmholtz qualifies the different gradations of idealism and realism as “metaphysical hypotheses” that cannot be established once and for all.<sup>60</sup> It is also clear that this epistemological framework can accommodate more or less optimistic views about the way in which one can build, from within the world of appearances, a correct representation of the real world.<sup>61</sup> Correlatively, it can lead to different views about the limits of physical knowledge, which Du Bois-Reymond had tried to indicate in a sharp and very skeptical way with his thought experiment.<sup>62</sup>

A realism informed by the very development of natural science was bound to provide means to counter Mach’s phenomenalism. This is precisely the case of a later representative of critical realism, the great physicist Max Planck, whose reflection on the subjects continued at least up until the 1930s, very much in line with the fundamental tenets of the previous representatives of critical realism and openly opposing any form of phenomenalism. Admittedly, Planck’s thought lacks philosophical rigor, and his criticism of Mach’s epistemology is, to say the least, naïve. However, he did give voice in a very clear way to a realism that most physicists would advocate today. Furthermore, as we shall see, Planck’s terminology allows a particularly clear comparison to be made between critical realism and Husserl’s views. In a text written in 1930, *Positivism and Real External World*, Planck begins by repeating that according to positivism (term he uses as a synonym of phenomenalism), the task of physics consists merely in connecting in the simplest possible way the phenomena appearing in the world of senses.<sup>63</sup> The world of the senses would, thus, appear to be the only horizon in which physical theory exerts its function. It is possible to break free from this positivistic cage (which, according to Planck inevitably leads to a form of solipsism) only by means of a leap into metaphysics, i.e., by accepting the in-principle improvable assumption that there is a second world: the external real world, which physics has the task to know by means of theoretical representations. In a text dating back to 1929, Planck characterizes such representations, the physical image of the world, as a third “world,” to be distinguished both

from the world given in perception and from the real one.<sup>64</sup> To the obvious objection that all experimental knowledge on which physical theories rests is confined to the world of senses, Planck answers as follows: "The two statements 'there exists a real external world independent from us' and 'the real external world cannot be directly known' amount together to the pivotal point of all physical science."<sup>65</sup> Accordingly, what physicists try to do is to decipher signs or messages sent by the real world and intercepted by their measurement devices and build a physical picture of reality that accounts for them. The task of physics is, consequently, to decipher these signs in order to build theoretical representations that approximate better and better the real world and that overcome the relativity of the world of senses to our sense organs (but also to the structure of our measurement instruments). While this physical image is perfectly known to us, the real world lies always beyond the scope of our knowledge. In short, "Scientific research presents itself to us as an incessant struggle for a goal that will never be achieved and in principle can never be achieved. The reason is that the goal is of a metaphysical kind, it lies behind any experience."<sup>66</sup>

According to Planck, there is a world which can be known directly but is relative to our contingent psychophysical constitution, i.e., the world of the senses. Further, there is the world of physics, which is only a creation of the human mind, and, as such, appears transparent to us. Finally, there is the real external world, which physics tries to approximate on the basis of "signs" left in the world of senses. These texts, while sharply criticizing any form of instrumentalism or positivism, do not explicitly profess a realist faith about this or that construct of physical theory. Rather, what they do is claim that there is a process of convergence of our theoretical representations towards the real world, which Planck justifies with reference to the increasing richness and predictive power of the successive theories accepted during the history of science and the fact that the world of physics is more and more abstract and remote from the world of common sense. This second statement was of course suggested by the recent appearance of quantum mechanics, with its complete rejection of the intuitive (imaginable) pictures of classical mechanics, a development to which Planck himself provided fundamental contributions. These two facts together indicate that a better and better approximation of the real world is taking place, even though, much in line with Helmholtz's stance with respect to what he had called "metaphysical hypotheses," Planck believes that this opinion cannot have a logical foundation any more than the belief that the world exists.

## §5. Summary and Conclusion

This chapter began with Cassirer's remark that, once the realism of mechanistic physics was brought into question both on scientific and on

philosophical grounds, there resulted a radical disagreement concerning the ontological value of physical theory. In this chapter, I have sketched some of the most influential points of view on the matter during the period in question. It has also appeared that the contrast did not simply surface at the “meta-level” of epistemology, for different participants in the debate disagreed also about the way physical theories had to be formulated and on the further scientific research that it was meaningful to pursue.

According to the realistic picture of the classical mechanistic world-view, the entities inhabiting the world are, ultimately, the atoms and the forces acting among them in conformity to a nomological structure that has objective validity.<sup>67</sup> The realistic interpretation of classical physical theory, no matter how conceptually satisfying and seemingly ontologically complete, was unable, as we have seen, to avoid metaphysical enigmas concerning the ultimate, intrinsic nature of reality. Instead of Du Bois-Reymond’s famous riddles, one could have developed similar considerations taking as the starting point the highly problematic metaphysical notions of absolute space and time used by Newton and rejected by Mach.

A radical way to ward off the reduction of physical theory to nothing but a great means to highlight our metaphysical ignorance, or, differently formulated, a radical way to redefine the task of science in general and of mathematical physics in particular in such a manner that only those problems that can be solved by the correct application of empirical method are declared meaningful, and that any dependence of physics on metaphysics is forsaken, is Mach’s phenomenalism. Mach’s position requires what Husserl would call a complete reinterpretation of the being of nature itself. All worldly objects, from the ordinary physical bodies of our experience to the egos themselves, amount, to Mach, to so many associative complexes of “elements” which are, in themselves, components neither of nature nor of the psyche. Physical theory does nothing more than continue in a self-aware and systematic way the effort of pre-scientific life to intellectually master the constant flux of such elements with the smallest expenditure of energy, i.e., in the most economical way. This is achieved through conceptual structures designed to provide a compendious description of experience and to anticipate its course.

According to Mach, all concepts function in this way, including those of pure mathematics. In keeping with the sphere of nature, our species long ago invented the notion of the “physical body” as a stable cluster of properties that can be perceived over and over again, the law-like behavior of which can be predicted in vague and qualitative terms. Physics has gone far beyond this level; it has learned how to associate mathematical values through measurement procedures to the elements interpreted as components of nature and how to formulate mathematical laws connecting these values. Further, it has developed theoretical frameworks

unifying in a deductive unity the various mathematical relations summarizing the manifold results of physical measurements. Hence, according to Mach, hypothetical entities must be totally expunged from physical theory; their role should be provisional and heuristic only. Physical theory has no ontological value whatsoever if by this is meant that it should try to mirror an extra-mental reality. Consequently, all metaphysical questions reaching beyond this alleged extra-mental reality are likewise removed. In conclusion, according to Mach, the data of the senses, the elements regarded as physical phenomena, are not signs of something else, of an external world which would contain the real entities signaling themselves in our mind through perception. On the contrary, physical bodies, egos, laws, etc., are but mental symbols standing for complexes and series of elements.

To this ontological devaluation of physical theory, and to the resulting elimination of metaphysics, critical realism opposes a view of knowledge of the external world which, in spite of its origin in Helmholtz's neo-Kantian program, is ultimately more Lockean than Kantian. Metaphysics comes back into the picture under the objectivistic assumption of an "external real world" that cannot be known directly by us but that "sends" its messages to us by interacting with our sense organs and our measurement apparatuses. This metaphysical assumption thus determines the task of physical theory as one of reconstructing in the most accurate way the external world existing in itself beyond the realm of perception. To this general framework belongs a range of different shades of realism, and, consequently, more or less optimistic accounts of the ontological value of physical theory. This is an obvious consequence of the fact that reality has been situated *ab origine* beyond the reach of the subject and that, therefore, only extrinsic inferential relations lead to it. We have seen that Helmholtz believed in an isomorphism between the laws governing the behavior of real entities and those we detect in the "phenomenal" world. The laws would thus be the real bearers of physical knowledge. Other authors have tried to develop this realism in more optimistic ways, yet the crucial problem remains unsolved, namely, that any such position ends up in an *ignorabimus* concerning the ultimate essence of reality the inner core of which lies, by definition, beyond the reach of physical theory, whether the latter is strictly mechanistic or not.

## Notes

1. Cassirer 1950, p. 84. The situation of physics is but a paradigmatic case of a much broader phenomenon affecting the totality of the sciences, beginning with logic itself. In the introduction of the *Prolegomena*, in reference to Mill's earlier characterization of the obscurity surrounding logic, Husserl describes the sorry philosophical state of the latter in the following terms: "Even today we are very far from complete agreement as to the definition of logic and the content of its essential doctrines" (Hua XVIII, p. 19; 2001, p. 11).



2. It is worth quoting this famous formulation of the ideal of a *complete mechanical knowledge* of the universe: “Given for one instant an intelligence which could comprehend all the forces by which nature is animated and the respective situation of the beings who compose it – an intelligence sufficiently vast to submit these data to analysis – it would embrace in the same formula the movements of the greatest bodies of the universe and those of the lightest atom; for it, nothing would be uncertain and the future, as the past, would be present to its eyes” (Laplace 1902, p. 4). “Laplace’s ideal” is mentioned by Husserl at the very end of the *Krisis* (p. 265). One should also notice that, as Duhem stressed, Laplace’s realism about the Newtonian worldview did not blind him to its inherent limitations. While believing that the law of attraction is the correct explanation for a vast number of different phenomena, he confessed that, at present, due to our ignorance of the inner structure of matter, we are unable to prove that it is a primitive law rather than the consequence of a deeper cause (Laplace 1809, Book V, Chapter 5). As Duhem suggests, Laplace seems even to imply that such ignorance cannot be overcome (Duhem 1996, p. 47).
3. Laplace 1902, p. 6.
4. See the negative appraisal of Cassirer (1950, pp. 86–87). The great work of Lange describes in detail and criticizes these positions from a neo-Kantian standpoint (Lange 1880).
5. “Knowledge of nature – more precisely, natural scientific knowledge or knowledge of the physical world with the help of and in the sense of theoretical natural science – is to explain the changes in the physical world by movements of atoms, which are caused by their time-independent central forces or to reduce the natural processes to the mechanics of the atoms” Du Bois-Reymond 1912a, pp. 441–442.
6. Du Bois-Reymond uses the evocative expression “astronomical knowledge” (“*astronomische Kenntniss*”) to refer to the kind of knowledge that one would achieve if the movements of all parts of a material system were known with the same certainty with which an ideally exact astronomy would describe the movements of celestial bodies. Du Bois-Reymond 1912a, p. 455.
7. Du Bois-Reymond 1912a, p. 460.
8. Du Bois-Reymond 1912a, p. 447.
9. Du Bois-Reymond does not claim that these theses are in any way original. He also refers the reader to a book by G. T. Fechner, *Über die physikalische und philosophische Atomenlehre*, written in 1857 (and reprinted in 1864), which indicates in the very title the central conceptual distinction on which his analysis rests. See Du Bois-Reymond 1912a, p. 469.
10. Du Bois-Reymond 1912a, p. 447.
11. Du Bois-Reymond 1912a, pp. 447–448.
12. Du Bois-Reymond 1912a, p. 448.
13. Du Bois-Reymond 1912a, p. 448.
14. Du Bois-Reymond 1912a, p. 449.
15. Du Bois-Reymond 1912a, p. 457.
16. Du Bois-Reymond 1912a, pp. 455–456.
17. Du Bois-Reymond 1912a, p. 456.
18. Du Bois-Reymond 1912a, p. 464.
19. Du Bois-Reymond 1912a, p. 447.
20. Du Bois-Reymond 1912a, p. 445. As Lange rightly argues, when Du Bois-Reymond, at the end of the text, evokes the possibility that the two limits of physical knowledge might be one and the same, and that, were we to learn the nature of matter and force, we would perhaps discover that it consists

in a substance that can think, he still reasons pretty much as a materialist (Lange 1880, pp. 318–319). Cassirer almost contemptuously points out that Du Bois-Reymond's *ignorabimus* completely rests on "the assumption that mechanism represents the sole trustworthy and possible route to understanding, and that outside it there can be no salvation for natural science" (Cassirer 1950, p. 87).

21. The fierce opposition that his theses met took Du Bois-Reymond by surprise, and prompted his polemical reply in a famous lecture delivered in Leipzig in 1880, *Die sieben Welträtsel*, which defends and expands the conclusions of the 1872 lecture (see Du Bois-Reymond 1912b). This lecture mentions, in addition to the previous two limitations of physical knowledge, two other "transcendent" or unsolvable problems: the origin of movement (Du Bois-Reymond 1912b, pp. 74–75) and the existence of free will (Du Bois-Reymond 1912b, pp. 80–93). The three other "less hopeless" riddles are the origin of life, the role of finality in nature, and the origin of rationality and language. This lecture is also noteworthy for the acrimonious response to Ernst Haeckel, who had criticized Du Bois-Reymond's *ignorabimus* on the grounds of the theory of the so-called *Atomseele*, which Haeckel thought could solve the main riddles of the philosophy of nature (Du Bois-Reymond 1912b, pp. 71–73). Haeckel popularized his views in the best-selling book *Die Welträtsel*, published in 1899 (Haeckel 1929). Both Du Bois-Reymond and Haeckel contributed to spreading the use of the expression "world-enigma," already used by Schopenhauer and Nietzsche and destined to acquire a new meaning in Husserl's philosophy.
22. Ostwald 1895, p. 6.
23. Ostwald 1895, pp. 19–20.
24. Ostwald 1895, p. 22. Ostwald, however, finally accepted the real existence of atoms, of course in a theoretical framework different from classical mechanism.
25. Mach 1919, p. 497. Mach had developed this approach in his famous works on thermodynamics.
26. Mach 1919, pp. 504–507. See also Mach 1914, pp. 313–314, where he credits Du Bois-Reymond with the positive effect of putting an end to fruitless efforts to explain the mind with the movement of atoms, but also accuses him of failing to acknowledge the ultimate source of these misguided scientific endeavors: "After all, Du Bois-Reymond's recognition of the insolubility of his problem was an immense step in advance; this recognition removed a weight from many men's minds, as is shown by the success of his work, a success which is otherwise scarcely intelligible. He did not, indeed, take the further important step of seeing that the recognition of a problem as insoluble in principle, must depend on a mistaken way of stating the question. For he too, like countless others, took the instruments of a special science to be the actual world."
27. Mach 1898, pp. 208–209.
28. Mach 1914, pp. 361–362.
29. This was the key to Mach's account of the relations between physics and psychology and his way to dissolve the problem of the relation between the mind and the body.
30. Though Mach regarded physiological psychology, at bottom, as a part of physics (Mach 1898, p. 210).
31. Mach's conception of originally neutral elements that can be regarded as making up the domain either of physics or of psychology exerted a strong influence on the so-called doctrine of *neutral monism*. It can also be viewed

### 30 *The Relation Between Theory and Reality*

as an empiricist version of Husserl's subsequent intentionalist account of how the same hyletic data can be differently apprehended in the constitution of material nature, of the *Leib*, and of the psyche.

32. Mach 1898, p. 189.
33. Mach 1898, pp. 200–201.
34. Mach 1919, pp. 483–485.
35. Mach 1919, p. 485.
36. This conception provides a clear example of what Husserl would denounce as naturalistic, aporetic thinking stemming from the failure to develop a theory of knowledge devoid of metaphysical presuppositions (see Chapter 2). Animals are, after all, living bodies surrounded by a natural world containing other living or purely physical bodies, and, according to Mach, bodies are nothing but “compensatory mental symbols for groups of sensations-symbols that do not exist outside of thought,” i.e., *useful fictions*. And yet, in order to explain the *true* inner workings of thought by means of the principle of economy, Mach does not hesitate to consider thought as a feature of animal species, which struggle for survival in a pregiven natural world. It follows that the very principle of economy, thus interpreted, only describes the behavior of a particular types of useful fictions and cannot be considered as the true law governing thought itself. Mach's theory of knowledge, thus, rests on metaphysical assumptions, such as the existence of the world and of embodied subjects driven by the survival instinct, which are either undermined or, at the very least, rendered unintelligible by his very theory of knowledge. Note further that if Mach's phenomenalism was a fundamental source of inspiration for the members of the Vienna Circle, his use of evolutionary biology in epistemology clearly anticipated Quine's more sophisticated (but no less inconsistent) naturalism.
37. “This tendency of obtaining a survey of a given province with the least expenditure of thought, and of representing all its facts by someone single mental process, may be justly termed an economical one” Mach 1898, p. 195.
38. Mach 1898, p. 205.
39. Mach 1898, p. 206.
40. Mach 1898, p. 207. This is, of course, Mach's mature view on the subject. At the beginning of his career, he adhered to atomism, too. More complex is the question whether Mach revised his mature anti-atomistic position towards the end of his life. As Erwin Hiebert remarks, this is very doubtful (Hiebert 1970, p. 79). It is possible to imagine that Mach came to attach more importance to the usefulness of the atomic hypothesis in the development of theoretical physics, but it is not easy to see how a form of realism about atoms could be reconciled with an epistemology according to which even macroscopic objects are mere economical devices.
41. Another author who wholeheartedly embraced the principle of economy was the French physicist Pierre Duhem. His name never seems to appear in Husserl's corpus, neither was he directly associated with any of the epistemological movements that Husserl implicitly or explicitly refers to, yet a copy of the aforementioned magnum opus written by the French physicist, *The Aim and Structure of Physical Theory*, is indeed present in Husserl's private library, though not bearing any tell-tale marks of diligent reading from underlining to comments in the margins (Rang 1990, p. 382). According to Duhem, the aim of physical theory is not to probe the inner structure of reality but to provide a unified and coherent mathematical framework classifying and ordering physical laws. However, Duhem departs from Mach in two fundamental

respects, which highlights how their convergence on the principle of economy belies the radical divergence of their philosophical outlooks. The first concerns Duhem's insistence that physical theory is necessary in order to raise what is observed during experimental work to the dignity of an *experimental fact*, i.e., to obtain something that can be subsumed under a physical law. Duhem's famous analysis of experimentation has become a classic reference for all discussions of the theory-ladenness of observation. Duhem has thus become a hero of anti-empiricist philosophy of science, in spite of Quine's subsequent appropriation of Duhem's epistemological holism. However, this aspect, hardly compatible with Mach's over-empiricist epistemology, is less important than the second major difference. If it is true that, according to Duhem, the aim of physical theory is not to explain phenomena, i.e., "to strip reality of the appearances covering it like a veil, in order to see the bare reality itself" (Duhem 1982, p. 7), this is not because he subscribes to Mach's phenomenalist reduction of all objects to complexes of elements. On the contrary, Duhem's thought is firmly and proudly rooted in the catholic scholastic tradition, and does not, for a moment, accept the positivism of Mach's thought. For him, a metaphysics unveiling the hidden essence of the material world is possible and necessary, although it cannot be developed with the same methods adopted by physics. In a text written in 1893, Duhem states his stubbornly traditional views about the relation between physics and metaphysics: "To acquire an understanding of the external world as complete as our means of knowledge permits, we must ascend successively two degrees of science. We must, in the first place, study phenomena and establish the laws of succession they follow. In the second place, we must induce from these phenomena the properties of the substances that cause them. The second of these sciences has received the name of *metaphysics*. The first is divided into various branches, according to the nature of the phenomena studied. The branch of science which studies phenomena arising from inanimate matter today bears the name of *physics*" (Duhem 1996, p. 31). Thus, according to Duhem, physics and metaphysics are two distinct disciplines that must give different contributions to the understanding of the "external world." To be more precise, the part of metaphysics the object of which is the essence of non-living matter is what traditionally has been called cosmology. Curiously, although Duhem quotes Mach rather often in his writings (also associating himself with Mach and Ostwald on the grounds that they share a hostile attitude towards "mechanical theories of matter" [Duhem 1982, p. 317]), to my knowledge at least, he does not distance himself as sharply as one would expect from Mach's anti-metaphysical outlook. Even in his extensive (and, of course, very praiseful) review of Mach's *Science of Mechanics*, Duhem only criticizes Mach's failure to acknowledge the historical links between the development of mechanics on the one hand and metaphysical and religious ideas on the other (Duhem 1996, pp. 120–121).

42. As noted by Vincent Gérard, Oswald Külpe presented a version of this doctrine at the 82nd Conference of German natural scientists in 1910 (Gérard 2005, p. 45). Another influential figure of the time is, of course, Hermann Lotze, whose theories of "*Lokalzeichen*" (see Lotze 1877) had a significant influence on the psychology of space perception. The latter, however, has only an indirect relevance for the questions addressed in this chapter.
43. Rang 1990, pp. 341–342.
44. Helmholtz 1855, p. 40. A detailed reconstruction as well as a critical appraisal of Helmholtz's work in the context of neo-Kantianism can be found in Beiser 2014.

### 32 *The Relation Between Theory and Reality*

45. According to Helmholtz, since the cause-effect relation is a precondition of all empirical knowledge, it cannot be derived from experience and, following Kant, it must be regarded as innate (Helmholtz 1855, pp. 41–42). As we have seen, Mach's radical empiricism completely rejects this Kantian legacy.
46. Rang 1990, p. 344.
47. Külpe 1923, pp. 187–193, where Külpe reconstructs the reasons why naïve realism must be superseded by critical realism.
48. Helmholtz 1977, pp. 115–163 (with interesting notes by Moritz Schlick).
49. Helmholtz 1977, p. 118.
50. Helmholtz 1977, p. 119.
51. Helmholtz 1977, p. 120.
52. Helmholtz 1977, p. 122.
53. Helmholtz 1977, p. 122.
54. Helmholtz provides a somewhat simplistic but nevertheless clear example: “If berries of a certain kind in ripening develop at the same time a red pigment and sugar, then a red color and a sweet taste will always be found together in our sensation for berries of this type” (Helmholtz 1977, p. 122). The only defect in this example is that the sensory quality “red” appears on the side of the object, so it would be more appropriate to say “a pigment with certain optical properties that we perceive as red.”
55. “That which remains alike, without dependence upon anything else, through every alternation of time, we call *substance*. The relationship which remains alike between altering magnitudes, we call the *law* connecting them. What we perceive directly is only this law. The concept of substance can be gained only through exhaustive examination and always remains problematic, inasmuch as further examination is not ruled out. Formerly light and heat were counted as substances, until it later turned out that they are perishable forms of motion. And we must still always be prepared for new decompositions of the currently familiar chemical elements” (Helmholtz 1977, p. 139). The 1878 address also contains a detailed criticism of Kant's view of space based on an analysis of the emergence of the representation of space through movements of the body that anticipates many Husserlian claims about the role of kinesthetic movements in space constitution.
56. Rang 1990, p. 247.
57. Rang also mentions Carl Stumpf's similar views on the question. According to Stumpf, too (who supervised Husserl's habilitation thesis in 1887), the hypothetical entities of theoretical physics are images or models of the real bearers (*Träger*) of natural laws that are unperceivable in principle (Rang 1990, p. 345). A clear formulation of Stumpf's view that the real subject matter of physics does not consist in the “phenomena” we perceive but in a hypothetical world independent of consciousness and governed by causal laws can be found in Stumpf 1907, pp. 10–20. These pages contain, in addition, an extremely clear and convincing criticism of Mach's phenomenalism.
58. See Ruoff 2008, p. 65.
59. Helmholtz 1977, p. 137.
60. Helmholtz 1977, p. 138.
61. Külpe, for instance, was more optimistic than Helmholtz and believed that the objects existing in the external world could be known up to a point. See Rang 1990, pp. 352–355.
62. Franz Brentano also expressed a point of view about the knowledge of the external world that is close to Helmholtz's, as a passage of §3 of the first chapter of the *Psychologie vom Empirischen Standpunkt* indicates (Brentano 1924, p. 28). The passage is also quoted and commented on by Rang (Rang

1973, p. 234). Brentano's form of realism is akin to those just discussed. He, too, regards subjective representations as signs. Furthermore, he claims that we can prove that there is a resemblance between the relations that manifest themselves at the level of the appearances and those obtaining between their objective causes.

Another variant of these epistemic stabilizations of the limits of knowledge was developed, at that time, by an author who does not belong to the German current of critical realism: Henri Poincaré. In his famous book *Science and Hypothesis*, Poincaré evokes the skepticism produced by the swiftness with which physical theories are often superseded by new ones. Poincaré mentions, in particular, the shift from Fresnel's optic to Maxwell's electromagnetism. These two theories postulate different entities in order to explain optical phenomena. In Fresnel's optics, light is treated as a *movement* of ether, thus as a mechanical phenomenon, whereas, in Maxwell's theory, it becomes a perturbation of a *field*, namely, the electromagnetic field. To the same perceptions, physical measurements, and empirical relations there correspond two different ontologies. Now, according to Poincaré, this disagreement concerns solely the "deciduous" part of physical theories, that is, the properly *ontological* part. Instead, one can identify the valuable and durable content of theories with the structural correspondence between their equations and reality, correspondence that allows the formulation of correct predictions: "They teach us now, as they did then, that there is such and such a relation between this thing and that; only, the something which we then called *motion*, we now call *electric current*. But these are merely names of the images we substituted for the real objects which Nature will hide for ever from our eyes. The true relations between these real objects are the only reality we can attain, and the sole condition is that the same relations shall exist between these objects as between the images we are forced to put in their place" (Poincaré 1905, p. 161, my emphasis). We find here, once more, the thesis that the real causes of our sensations will never be known. Indeed, if our theories are unable to correctly portray the nature of light, then they are also unable to tell us the ultimate cause of, say, a color perception. This passage contains, moreover, a rather explicit formulation of the *structural* character of physical knowledge, the only form of access to reality that remains possible once we have abandoned the hope of knowing the intrinsic nature of the world. Let us stress that Poincaré does not refer here to perceptual images, but to the theoretical models that physicists use to build their theories. These models, which Poincaré seems even to identify with mere *names*, are not themselves the bearers of the knowledge that we have of the external world, precisely because this function is exerted by the *relations* existing among them. A faithful image of reality is something physical theory cannot provide. Poincaré's point of view is widely regarded as a predecessor of the position today's philosophers of science call "structural realism."

63. Planck 2018, p. 197.

64. Planck 1952, p. 10.

65. Planck 2018, p. 202.

66. Planck 2018, p. 202.

67. Within this structure, it is possible to establish a hierarchy between, on the one hand, physical principles (such as Newton's principles of dynamics) and general laws (such as Newton's law of gravitation and Coulomb's law of electrostatic attraction) and, on the other hand, more "low-order" laws that, ideally, can be deduced from the former, such as Galileo's law of descent.

## Bibliography

- Beiser, F. (2014). *The Genesis of Neo-Kantianism: 1796–1880*. Oxford: Oxford University Press.
- Brentano, F. (1924). *Psychologie vom empirischen Standpunkt, Erster Band*. Leipzig: Philosophische Bibliothek.
- Cassirer, E. (1950). *The Problem of Knowledge*. New Haven: Yale University Press.
- Du Bois-Reymond, E. (1912a). Über die Grenze des Naturerkennens. In: E. Du Bois-Reymond, ed., *Rede von Emil Du Bois-Reymond in zwei Bände*. Ester Band 2. Leipzig: Veit & Comp, pp. 441–473.
- Du Bois-Reymond, E. (1912b). Die sieben Welträtsel. In: E. Du Bois-Reymond, ed., *Rede von Emil Du Bois-Reymond in zwei Bände*. Zweiter Band 2. Leipzig: Veit & Comp, pp. 65–98.
- Duhem, P. (1982). *The Aim and Structure of Physical Theory*. Princeton, NJ: Princeton University Press.
- Duhem, P. (1996). *Essays in the History and Philosophy of Science*. Indianapolis: Hackett.
- Fechner, G. (1864). *Über die physikalische und philosophische Atomenlehre*. Leipzig: Hermann Mendelssohn.
- Gérard, V. (2005). Husserl et la phénoménologie de la chose. In: G. Samana, ed., *La connaissance des choses*. Paris: Ellipses, pp. 139–149.
- Haeckel, A. (1929). *The Riddle of the Universe*. London: Watts & Co.
- Helmholtz, H. (1855). *Ueber das Sehen des Menschen*. Leipzig: Leopold Voss.
- Helmholtz, H. (1977). *Epistemological Writings: The Paul-Hertz-Moritz-Schlick Centenary Edition of 1921*. Dordrecht: D. Reidel Publishing Company.
- Hiebert, E. (1970). The genesis of Mach's early views on atomism. In: R. Cohen and R. Seeger, eds., *Ernst Mach Physicist and Philosopher*. Dordrecht: Springer, pp. 79–106.
- Hua VI. Husserl, E. (1954). *Die Krisis der europäischen Wissenschaften und die transzendente Phänomenologie: Eine Einleitung in die phänomenologische Philosophie*. The Hague: Martinus Nijhoff; *The Crisis of European Sciences and Transcendental Phenomenology*. D. Carr (Trans.). Evanston, IL: Northwestern University Press, 1970.
- Hua XVIII. Husserl, E. (1975). *Logische Untersuchungen. Erster Band. Prolegomena zur reinen Logik*. The Hague: Martinus Nijhoff; *Logical Investigations*. Vol. I. J. N. Findlay (Trans.). London and New York: Routledge, 2001, pp. 1–161.
- Külpe, O. (1923). *Einleitung in die Philosophie*. Leipzig: Verlag von S. Hirzel.
- Lange, F. (1880). *History of Materialism and Criticism of Its Present Importance*. Vol. II. Boston: Houghton, Osgood, & Company.
- Laplace, P.-S. (1809). *The System of the World*. Vol. 2. London: Printed for R. Phillips.
- Laplace, P.-S. (1902). *A Philosophical Essay on Probabilities*. New York: John Wiley & Sons.
- Lotze, H. (1877). De la formation de la notion d'espace: la théorie des signes locaux. *Revue Philosophique de la France et de l'Étranger*, 4, pp. 345–365.
- Mach, E. (1898). *Popular Scientific Lectures*. Chicago and London: The Open Court Publishing Co.

- Mach, E. (1914). *The Analysis of Sensations*. Chicago and London: The Open Court Publishing Co.
- Mach, E. (1919). *The Science of Mechanics*. Chicago and London: The Open Court Publishing Co.
- Ostwald, W. (1895). *Die Überwindung des wissenschaftlichen Materialismus*. Leipzig: Verlag von Veit & Comp.
- Planck, M. (1952). *Das Weltbild der neuen Physik*. Leipzig: Johann Ambrosius Barth Verlag.
- Planck, M. (2018). *Wege zur Physikalischen Erkenntnis*. Norderstedt: Bod.
- Poincaré, H. (1905). *Science and Hypothesis*. London and New Castle-on-Tyne: The Walter Scott Publishing Co., Ltd.
- Rang, B. (1973). *Kausalität und Motivation*. The Hague: Martinus Nijhoff, 1973.
- Rang, B. (1990). *Husserls Phänomenologie der materiellen Natur*. Frankfurt am Main: Klostermann.
- Ruoff, M. (2008). *Hermann von Helmholtz*. Paderborn: Wilhelm Fink GmbH & Co. Verlags-KG.
- Stumpf, C. (1907). *Zur Einteilung der Wissenschaften*. Berlin: Verlag der Königl. Akademie der Wissenschaften.



## 2 Husserl's Conception of Natural Science Between the Theory of Knowledge and Metaphysics

### §1. Husserl's Early Interest in Metaphysics: The Example of the Metaphysics of Space

It is by now a well-known fact that Husserl saw from the beginning the development of a scientific metaphysics as the aim of his entire intellectual enterprise.<sup>1</sup> Eventually, as we shall see, Husserl will come to identify scientific metaphysics with “metaphysics founded on transcendental phenomenology” (“*transzendentalphänomenologisch fundierte Metaphysik*”).<sup>2</sup> This metaphysics comprises a first layer of questions concerning precisely the world as the object of the empirical sciences, and the second layer of the so-called highest and ultimate questions concerning God, immortality, and the sense of the world.<sup>3</sup> In this chapter, I will focus on the evolution of Husserl's ideas concerning the first layer of questions, and, in particular, concerning the relation between the theory of knowledge,<sup>4</sup> natural science, and metaphysics.<sup>5</sup>

The texts Husserl wrote in the early 1890s as part of a subsequently abandoned project on the philosophy of space that would follow his *Philosophy of Arithmetic*, later collected in the so-called *Raumbuch*, contain some of the fundamental elements of Husserl's subsequent conception of the relation between positive sciences, metaphysics, and the theory of knowledge. Although these early texts do not contain a general definition of metaphysics, they offer an implicit characterization of it that is fairly consistent with Husserl's later developments. Moreover, as we are about to see, Husserl's early metaphysical interests, in line with the preoccupations of the authors mentioned in the previous chapter, concern *the ontological value of scientific representations*. Let us stress that the aim of this section is not to provide a comparison between Husserl's first reflections on space and the predominant views of the time,<sup>6</sup> but rather to reconstruct how he framed the metaphysical issues connected to the critique of scientific knowledge.

In a text dating from circa 1892,<sup>7</sup> Husserl identifies three groups of questions – psychological, logical, and metaphysical – pertaining to the philosophy of space. Unsurprisingly, at this stage of Husserl's thought,

the first group provides the basis for the remaining two. Psychological questions are either descriptive or genetic. The former concern the characterization of the content and internal articulation of our spatial representations while the latter deal with their origin in the individual or in the species.<sup>8</sup> Needless to say, these questions will be taken up in a modified form in Husserl's later constitutive analyses of space.<sup>9</sup> More unusual for the contemporary reader is the second group of questions, those pertaining to the "logic of space." What does Husserl mean by "logic" in this context? Husserl defines logic as "nothing else than a new grouping of the psychology of judgement guided by certain aims."<sup>10</sup> Accordingly, the task of a "logic of space" will consist in taking as a point of departure the representation of space, i.e., the material analyzed by the psychology of space, and trying to understand whether this representation is adapted to the aim of the scientific knowledge of space achieved by geometry. This somewhat obscure formulation can be better understood in light of the examples of logical questions introduced a few lines after while introducing the metaphysical questions:

However, the aforementioned research has a direct objective significance for the metaphysics of space. They form its indispensable preliminary stage. Whether space is an intuition or a concept, whether the procedure of geometry is intuitive and based on ostensible construction or unintuitive and based on mere concepts, whether the basic geometrical concepts and judgments are empirical or a priori, whether geometry is an inductive science only in a deductive stage . . . *These and similar questions are not merely logical but, by virtue of the consequences they really or allegedly imply, also metaphysical questions.*<sup>11</sup>

This passage contains an interesting list of problems that one would normally rank under the heading of the theory of knowledge, as Husserl's later terminology would also prescribe (whether geometry is a priori or empirical, whether it requires induction, etc.). Indeed, the logic of space appears as an *epistemological* reconsideration of the results of the psychology of judgement governed by the *telos* of the clarification of the scientific knowledge of space. By virtue of its consequences, such epistemological reconsideration provides the indispensable preliminary stage ("*unerläßliche Vorstufe*") for the questions pertaining to what Husserl calls the *metaphysics of space*. Actually, some questions are not only logical, but, by virtue of their consequences, they are already *also* metaphysical. The metaphysics of space is characterized, in turn, in the following terms:

If we now have to identify the problems belonging to a metaphysics of space, then these are the following: Does the space of our representation have a metaphysical value, i.e., does there correspond to it

something real or not in a transcendent sense to be supposed in some way? If the former should be the case, is it an exact image [*Abbild*] of its metaphysical correlate? Or do merely certain “fundaments of validity” [*geltende Gründe*] correspond to it in what is transcendent, about the nature of which we cannot know absolutely anything? Or is not the truth in the right middle, and not the material but the formal, that is, the logical content of our representation points to a transcendent analogon, so that those fundaments of validity may be identified as a manifold, which is logically to be subsumed under the concept of a three-dimensional Euclidean manifold?<sup>12</sup>

From this passage, it appears that Husserl ranks under the heading of metaphysics the problem of what corresponds to our representations in the real, transcendent world. The first question is whether our representation of space has a “metaphysical correlate” at all. If the answer is affirmative, then different alternatives present themselves, which are characterized by a classical parameter of correspondence between representation and reality: (1) our representation corresponds “exactly” to transcendent space; (2) transcendent space contains only some “fundaments of validity” corresponding to our representation, of which we can in principle have no knowledge (transcendent space exists, and it has something in common with our representation of it, but we can have no knowledge of this common element); (3) transcendent space not only contains some “fundaments of validity” corresponding to our representation, we can also know that they are not material but formal, i.e., that they concern not the sensuous content of our representation of space but its formal structure, the pure form of the Euclidean space of geometry. According to this third option, transcendent space would not be similar to our representation in an intuitive sense. The latter would point to the former, but only inasmuch as the logical relations among its elements are concerned. Let us stress that this formulation resonates with the post-Kantian problematic framework of critical realism, with its effort to assess to what extent, and in what respect, the world as it is in itself is accessible to our knowledge.

Metaphysical claims, in this sense, do not equate to ordinary empirical claims about reality, nor to the face-value ontology of our scientific theories, because they are intrinsically entangled with the critique of knowledge. Without relation to the critique of knowledge, both prescientific and scientific claims about reality have *no metaphysical value at all*, and, in the genuine sense of the word, *no ontological value at all*. This fact is highlighted in a brief text from around 1893,<sup>13</sup> the purpose of which is precisely to show how the answer to the central problem of the metaphysics of space is a consequence of the critique of geometrical knowledge, or, in keeping with the terminology of these texts, of the logic of space.

First, Husserl considers Kant's transcendental aesthetics. Kant's conception of space as an a priori form of intuition, as a condition of experience, according to Husserl, implies that "there is no metaphysical correlate of space."<sup>14</sup> Such a metaphysical consequence is deemed to stem from Kant's conception of the logic of geometry, according to which the space of geometry is not a concept, but an intuition, and, because the sentences of geometry are synthetic a priori, space cannot be derived from experience and must be regarded as a priori.<sup>15</sup> Thus, from Kant's "logic of space" it follows that space only exists *in us*. This sketchy analysis of Kant's transcendental aesthetics is a precious indication of Husserl's early philosophical outlook, and, more specifically, of his manner of connecting metaphysical problems to epistemological ones. Husserl then considers the positions of positivism and realism on space, i.e., the usual classical rival stances on the problem of the "objective" correlate of space. According to Husserl, positivists, *contra* Kant, rightly acknowledge that geometry is derived from experience by idealization, and that this fact, not the a priori character of spatial intuition, grounds its applicability to experience. However, they draw the further conclusion that there is no reason to believe in the existence of a real transcendent correlate of our spatial representations, laying beyond the world of intuition.<sup>16</sup> Realists, on the other hand, take geometry to be an abstract science of nature, that is, a science the aim of which is to determine the spatial form of the real world, and do not identify this spatial form either with the space of intuition or with the ideal space of geometry obtained through idealization from the former, identifying it instead with a "certain three-dimensional spatial continuum."<sup>17</sup> This means that the realists acknowledge that the real spatial form of nature (in Husserl's terms, the metaphysical correlate of our representation of space) shares with the space of geometry the number of dimensions, but perhaps not the Euclidean character: the real transcendent space would be only *a certain* tridimensional continuum. This reading is supported by Husserl's rejection of Lotze's claim that, out of logical necessity, the real space of the world cannot have a number of dimensions different from three and cannot be curved. Husserl objects to Lotze's thesis in the following terms:

The three dimensions, etc., this is an empirical factuality, though a general fact (a law) like the law of gravitation. Thus, there is only an enormous improbability that space is not Euclidean; although we have to leave this possibility open. The probability is to be sure not infinite; because the range of our observational errors is finite. Only if our observation reached into each range, could we set the probability " $\infty$ ." Infinite is only the probability that space harmonizes with the Euclidean continuum in the limits set by our observation technique.<sup>18</sup>

Thus, in the early years of his career, Husserl held a view of the relation between geometry and physics opposite to the one he will later defend. Here, he regards the Euclidean nature of space as an empirical fact, on a par with Newton's law, one that we can verify with an infinite process of approximation, and that, in principle, measurements more precise than the ones available to us could contradict, no matter how improbable that may be. Thus conceived, Euclidean geometry is in no way part of an a priori science of nature, as Husserl later will claim; on the contrary, that the spatial form of nature is Euclidean is here considered an *empirical hypothesis*. Let us also notice that if, among these options, Husserl seems to favor a version of the realist picture, it is because he certainly rejected both the Kantian and the positivistic pictures. However, the aim of this brief text is only to highlight the priority of the logic of space over metaphysical questions, not to formulate a specific answer to the latter.

The articulation of the different points of view on space has required the distinction between different notions of space. Indeed, in a sort of summary of the text written approximately at the same time,<sup>19</sup> Husserl presents the following list of different senses in which one uses the term space:

1. The space of everyday life, the space that we know before and outside science and which underlies all "external intuition."
2. The space of pure geometry, to which the "geometrical intuition" refers.
3. The space of applied geometry, i.e., of natural science.
4. The space of metaphysics, the possible transcendent space.<sup>20</sup>

Husserl then concludes: "We are obviously dealing here with a genetic sequence of formations that it will be our task to explore in detail."<sup>21</sup> As we shall see, this passage mentions what will become, with some important modifications, the "layers" of the constitution of the *one* space of physical science. Indeed, we will have the opportunity to explain in detail how the theory of constitution can answer the question raised in this passage within a considerably modified theoretical framework.

In conclusion, in these early texts, Husserl calls "metaphysical" the questions concerning the ontological status of the transcendent reality lying beyond our representations, where the meaning of the term transcendent remains, at bottom, unspecified. It also appears that metaphysical investigations thus defined are made possible by "logical," i.e., epistemological, premises, which are based, in turn, on psychological descriptive and genetic analyses. According to the resulting picture, the careful investigation of the content, structure, and origin of our prescientific, as well as our scientific, representations has a founding role for the kind of critique of knowledge that only allows adjudging the metaphysical status

of our claims about the reality represented by such representations. As we are about to see, Husserl will subsequently stress even more markedly the dependence of metaphysical questions on the critique of knowledge and, more generally, on the role of the knowing subject.

## §2. The Problem of Knowledge as the Determining Factor of the Conception of Reality

A text written as an introduction to a lecture given in the academic year 1898–1899, *Theory of Knowledge and Key-Points of Metaphysics*, contains all the major themes of Husserl's subsequent reflection on the relation between the theory of knowledge, natural science, and metaphysics. This text thus deserves careful attention in the present study. Its specificity consists in presenting an early, and thus “pre-transcendental,” reflection on the incompleteness of natural science and on its need for a philosophical closure able to satisfy our highest theoretical interests. Furthermore, unlike many subsequent analyses, this text is rich in references to the scientific and philosophical debate in 19th-century German-speaking culture, references that partly supplement and partly overlap those discussed in Chapter 1. As will become customary for Husserl, this introduction also begins with an emphasis on the unique and problematic character of philosophical reflection with respect to all other scientific disciplines. The task of philosophy itself arises through the special sciences themselves and their shortcomings: the need for a higher order rationality is highlighted from within the theoretical drive that is at work, albeit in diminished form, in the special sciences.

The theory of knowledge and metaphysics, says Husserl, are the most important areas of philosophy, but their real nature is far from clearly defined.<sup>22</sup> As we shall see, Husserl's own view on the relation between these two disciplines oscillates in the years preceding the transcendental turn and so does his terminology. More specifically, the aim of this lecture is to present the theory of knowledge as the fundamental science preceding all others, intimately connected to some of the fundamental metaphysical issues. Let us recall that in the *Prolegomena* (written more or less at the same time) Husserl characterizes the “cardinal question of the theory of knowledge” as that of the “objectivity of knowledge.”<sup>23</sup> The theory of knowledge, as we have anticipated, consists in an elucidation of the essence of knowledge guided by the aim of clarifying how a subject's cognitive accomplishments can acquire objective validity. The aim of this text – an aim, to be sure, only partially achieved – is to clarify the relations between the theory of knowledge and metaphysics. At the time, there were conflicting views about how to circumscribe these disciplines and to understand their relations, and, furthermore, there was a widespread skepticism about the very possibility of a scientific metaphysics.

In addition, as we shall see in the next section, Husserl presents an early account of the specific kind of conceptual work necessary to overcome the limitations of the knowledge afforded by natural science.

In these pages, Husserl adheres to a narrative that was common coin at the time.<sup>24</sup> According to this narrative, after the great critical work of Kant, German idealism pursued the project of metaphysics in a way both lacking in intrinsic scientificity and in open conflict with the special sciences flourishing at the time. The overthrow of the “conceptual romanticism”<sup>25</sup> of Schelling’s and Hegel’s schools, which Husserl describes with unusual rhetorical vividness, was the inevitable and quite welcome upshot of these two inherent flaws.<sup>26</sup> However, it also had the regrettable consequence of persuading scientists as well as many philosophers of scientific orientation that metaphysics as such deserved to be forsaken. It is unsurprising, then, that professional philosophers should react to the ruin of idealistic metaphysics by going *back to Kant*, the great father of the critique of knowledge.<sup>27</sup> Such was the context in which Husserl’s own philosophical career began. This context appeared characterized, on the one hand, by the growing specialization within the sciences, triumphant and ever increasing in number, and, on the other hand, by the disrepute brought to the philosophers’ pretention to gain rational insight into reality independently from or even in contrast to the results achieved by science. Consequently, the philosophical community proclaimed the primacy of the theory of knowledge, and, more specifically, of scientific knowledge. Only recently, Husserl adds, have philosophers hesitantly explored new ways towards metaphysics, in a territory heavily controlled by scientists.<sup>28</sup>

While adhering to this common narrative, Husserl stresses his distance from the anti-metaphysical and positivistic trends. Quoting the early 19th-century metaphysician Friedrich Beneke, he asserts that the need for metaphysics must find a rational satisfaction, otherwise it will seek an irrational one in superstition and occultism.<sup>29</sup> Scientists’ anti-metaphysical stances only target, under the old idealistic metaphysics, a strawman and not the authentic idea of metaphysics, which idealist philosophers were not worthy of representing. Scientific metaphysics, instead, is no philosophical vagary, and scientists themselves cannot possibly expel it from their own disciplines. The following programmatic statement highlights how fundamental a role Husserl ascribes to metaphysics within his philosophical program:

But we want to have a philosophy; we want to acquire it through the most careful analysis and critique. Following the principle that only the fullest clarity and distinction of the concepts makes certain knowledge possible, we will declare war from the outset on any vagueness and ambiguity. We want to dig down to the ultimate, absolutely certain foundations of knowledge, in order to build upon

them a genuine and reliable theory of knowledge, and to acquire thereby also a dependable instrument for metaphysical research.<sup>30</sup>

As is clear, there is little doubt that Husserl attaches to the theory of knowledge a fundamental value for all philosophical disciplines, and, in particular, for metaphysics.

In contrast with the earlier analyses on space, we now find an explicit attempt to characterize the relation between metaphysics and science with the aid of two conceptual frameworks: Aristotle's definition of first philosophy<sup>31</sup> and the prescientific conception of the world ("*vorwissenschaftliche Weltauffassung*"<sup>32</sup>) that characterizes the natural man and is inherited by the scientific man.<sup>33</sup> The reference to Aristotle's definition of first philosophy in *Metaphysics Γ* is rather generic, and Husserl does not delve into the intricacies of the various Aristotelian characterizations of metaphysics. The point is to highlight that each positive science investigates a certain specific domain of reality and no other domains. Nevertheless, with reference to any given domain, they all presuppose the entire world and its essential components. This allows Husserl to connect his analyses to Aristotle's idea of a science that would study, rather than this or that domain of being, being as such. Aristotle's definition is here only a starting point, apt to introduce a characterization of the fundamental assumptions that are common to all sciences and stand in need of philosophical elucidation. Such assumptions are, in the first place, those already rooted in the prescientific, "natural" conception of the world underlying the technical work of scientists, for instance, the very belief in the existence of the external world and of the things and causal processes of which it consists.<sup>34</sup> Husserl points out that scientists do not carry out the critical work needed to question these assumptions, not even in the course of the modification of their beliefs:

[The natural scientist] actually confronts the things and the scientific questions as naively as the natural man before all science does. As we saw earlier, he just assumes the intellectual effort of natural consciousness. He finds already before him the surrounding world with its things, processes, relations, regularities of succession and coexistence, and follows only the motives laying in what is given for the modification of his initial or gradually acquired beliefs.<sup>35</sup>

Any serious critique of these assumptions immediately leads back to the problem of knowledge, i.e., to "if and how the subjective cognitive lived experience of the thinking subject can arrive at something objective, at a being in itself, which is what it is, whether it is known or not."<sup>36</sup> In line with the more specific considerations concerning space analyzed in the previous section, but at a much more general level, Husserl shows



that different answers to the problems of the theory of knowledge imply different conceptions of reality, or, better, different interpretations of the being of reality, which profoundly modify the prescientific conception of the world.

The first position considered by Husserl is solipsism, which derives from the thesis that only the subject's lived experiences in the moment in which they occur can become objects of knowledge.<sup>37</sup> Husserl mentions solipsism, i.e., a theoretical construct rather than a point of view actually represented in the history of philosophy, to show how its very theoretical conceivability exerts an influence over a number of philosophical positions. Berkeley's reduction of all realities to spiritual substances, whether finite or infinite, and to ideas inhering in them, is briefly evoked, but only to introduce more up-to-date (and radical) versions of empiricism. In all likelihood, Husserl has in mind as well Mill's famous conception of reality as the "permanent possibility of sensation." Yet, the following quotations count as more than indications that Husserl is referring chiefly to the most recent developments of this view, i.e., to Ernst Mach and Richard Avenarius.

Already Berkeley puts forth the equation: *esse = percipi*. The more recent thinkers add: being is = to be perceived or to be able to be perceived. Actual and possible perception makes up being. Only what is apprehended by consciousness or connected by fixed laws to the data of consciousness is real. It is the fixed lawfulness that guarantees perceptibility. A thing is nothing but a complex of partly real, partly lawfully possible perception(s); and thus also the entire world is reduced to groups of perceptions arranged in many ways and lawfully connected, with their appurtenant possibilities of perception.<sup>38</sup>

For everything that is thought as being is indeed given in thought. It can only be represented as a being given to consciousness, represented; *it can only constitute itself with elements that we have experienced [erlebt]*, and according to forms of connections that we have found thinking at some point about the appearing objects.<sup>39</sup>

This is, to be sure, the "*heutzutage sehr verbreitete*" conscience-idealism<sup>40</sup> within the German-speaking philosophy of the time (Mach's most important works appeared in the 1880s and 1890s), which Husserl, along with many others, also called "positivism." The presence of the term "element" in the second quotation, which, as we saw in the previous chapter, designates the central concept in Mach's philosophy, is a clear sign. Finally, the first quotation clearly indicates that Husserl is referring to Mach, who claimed that his notion of functional dependencies between elements "according to stable laws" had rendered superfluous Mill's conception of reality as the permanent possibility of sensation.<sup>41</sup>

Let us also note that the italicized part of Husserl's second quotation contains a formulation of Mach's view that sounds nicely "pre-formed" to be criticized by Husserl (as he does so often and with an uncommon talent). Indeed, readers of the *Logical Investigations* cannot but think of Husserl's distinction between the immanent contents of sensations, which are literally *erlebt*, and the transcendent object, which is grasped but not *erlebt* (nor reducible to a simple associative complex of data immanent to consciousness).

Just as in his early writings on space, Husserl then considers Kant's position and realism in turn. Kant's theory of knowledge, according to Husserl, entails a conclusion that is similar to idealism, with the difference that beyond the appearances of our internal life and of the external world there lie the unknowable things in themselves. The being of nature, in this way, is reinterpreted as that of a phenomenon.<sup>42</sup> This is, at least, the interpretation of Kant that Husserl considers as the most common and that, as we have seen, he had already followed at the time of the *Raumbuch*. All these different positions sharply modify the conception of reality characteristic of the "natural man." This is less the case for realism, which Husserl evidently regards as the position that is opposed to solipsism and which admits the existence of both the mind and the external world. Thus, the realist tries to solve the problem of the objectivity of knowledge in such a way as to remain as close as possible to common sense. For the realist, "the doubts about the objectivity of knowledge can be solved without thereby essentially affecting the main features of the conception of the world as they have already developed in ordinary life."<sup>43</sup>

This discussion is indeed very short and not generous in details concerning these "metaphysical positions," as Husserl himself calls them, or their different variants. This is because these examples are just meant to illustrate the interdependence of one's solution to the essential questions of the theory of knowledge and one's general view of the "being of reality"; as Husserl expounds, "the examples suffice to show how the difficult fundamental questions concerning the objectivity of knowledge tend to determine our entire conception of the being of the world, and that the possible opinions here are many."<sup>44</sup> These conclusions are in line with Husserl's early reflections on the metaphysical problems concerning space, but they present a significant advance made possible by the use of the notion of the natural man's prescientific conception of the world, which represents a clear anticipation of what Husserl will call the *natural attitude*. As Aristotle's idea of first philosophy already highlights, to each science there corresponds a limited domain of worldly being, but each such domain can be cognized only by presupposing what is true about worldly being in general. In the first place, the very existence of the world must be assumed. Now, the metaphysical value of scientific

knowledge as a whole is *opaque* because scientists take up the natural, implicit conception of the world without critically assessing it. It follows that a metaphysical critique of science does not simply consist in coming to a decision concerning the metaphysical value of this or that representation, but in giving an “ontological form” to the totality of reality, or *an interpretation of its being*, as Husserl says. Such interpretation rests, in turn, on the specific solution one gives to the questions of the theory of knowledge (which now subsumes all questions that Husserl had earlier ranked under the heading of “the logic of space”). Thus, the theory of knowledge provides the means to criticize the prescientific conception of the world and to formulate a general metaphysical characterization of reality addressing the metaphysical questions closely connected to the epistemological questions.<sup>45</sup>

### §3. Natural Science's Ontological Inadequacy and Metaphysics as the Ultimate Science of Reality Completing It

So far, we have focused on the assumptions that constitute the necessary background of all sciences, such as the existence of the world. According to Husserl, these assumptions are metaphysical in an Aristotelian sense precisely because they concern real being in general. What is the place of the specific results of the empirical sciences within this problematic? What is their contribution to the knowledge of the ultimate being of the world? More specifically, what is the ontological status of the hypotheses concerning reality that they put forward? Interestingly, this text presents an explicit and remarkably pessimistic view about the cognitive value of such sciences.

Husserl focuses on the sciences of nature and puts forward the following claims. (1) The sciences of nature do investigate the things and processes of the world of experience – they study, decompose, and classify them and their behavior as if it were possible to reduce them to their ultimate components (“*Elementen*” this time, not used in Mach’s sense) – but they end up realizing that “the law alone is what remains the same through change.”<sup>46</sup> (2) The quest for the laws governing the evolution of the different groups of phenomena becomes, therefore, the aim of natural science, which attempts to explain appearances on the basis of their nomological interconnection.<sup>47</sup> (3) Therefore, what natural science aims to achieve is but a form of successful orientation in the world of appearances and of practical mastery, *not* knowledge of reality.<sup>48</sup> Husserl insists on the practical values of the “formulas” that constitute the real goal of the natural scientist’s efforts. To reinforce what might seem to be (but, as we are about to see, is not) a thoroughly instrumentalist reading of the mathematical sciences of nature, Husserl answers two possible objections. The first is that physics, too, in its own theoretical and

experimental developments, distinguishes between appearance and reality, while the second concerns the fact that physicists often make hypotheses about realities supposed to exist behind the phenomena.

The first objection clearly points to the distinction between primary and secondary properties, although it does not make any explicit mention of said distinction. Indeed, Husserl acknowledges that scientists do not stop their inquiries at the things as they appear in perception. However, this natural-scientific positing of a reality existing beyond appearance (namely, of things defined in terms of primary properties as opposed to things endowed with sensible qualities) has only the aim to overcome the conflict among beliefs based on immediate perception.<sup>49</sup> Husserl is likely to be thinking of the fact that, for instance, a concept such as that of temperature allows settling the disagreement between one person's contention that the wind is cold and another person's contention that the wind is not cold. Yet, once more, according to this early formulation of Husserl's theory of natural science, this scientific way of overcoming disagreement does not rest on an analysis of the relation between knowledge and being; rather, it "succeeds on the basis of the knowledge of the laws governing the succession and connection of the appearances."<sup>50</sup> That said, in spite of any methodological virtues, Husserl deems ordinary scientific procedures unfit to secure any steady grasp on reality, for "what is essential in the ultimate metaphysical sense lies completely outside the sphere of his [the natural scientist's] interest."<sup>51</sup>

The answer to the second objection contains one of the rare actual examples of physical methodological procedures in Husserl's entire corpus. Interestingly, it is also the one Mach had discussed in the *Science of Mechanics*: the hypothetical electrical fluid introduced to explain electrical phenomena. As is well known, at that time, physicists often spoke of electricity as a fluid having certain properties, which explained the known empirical regularities and sometimes made possible the prediction of new electrical phenomena. However, according to Husserl, even this entity-positing activity is not guided by a genuine metaphysical interest. A representation of this kind is only an "analogic image" ("*analogisches 'Bild'*") serving as an "aid for the imagination" ("*Hilfsmittel der Phantasie*"),<sup>52</sup> the function of which is to help the researcher find the mathematical formulae to correctly describe the phenomena.

The examination of electric phenomena leads him, for instance, to analogies with hydrostatics. The phenomena evolve quite similarly to the way they would if electricity were a liquid, although one inaccessible to our senses. And, thus, the physicist initially operates with the hypothetical representation of an invisible electrical fluid. He now follows the analogies as accurately as possible; he asks himself: what physical properties would the fluid need to have to give rise, flowing from body to body, in the different classes of cases, to the

phenomena that we actually find? He tries with these or those qualities, on the basis of which a hypothetical mathematical law of the electrical phenomena arises for him. If it then turns out that such a law does not merely summarize the phenomena based on which it has been constructed, but rather that, as its necessary consequence, new types of phenomena would have to emerge, which actually find a subsequent verification, and if the hypothetical law keeps confirming itself in this way through ever new predictions and verifications, then it gains for him a high probability, and, only now, he calls it electrical law instead of a hypothesis.<sup>53</sup>

This passage describes in broad strokes the auxiliary functions of physical hypotheses about unobservable entities. Husserl further stresses the merely provisional and instrumental value of such hypotheses by adding that several different representations may lead to the formulation of the same laws and that, as research progresses, such representations can give way to new ones while “the real laws tested by countless verifications do not change.”<sup>54</sup>

Husserl's conclusions are extreme: due to the task that it has set itself, physics cannot aim at the knowledge of the ultimate nature of reality. Actually, its opposition to metaphysics is fully justified, insofar as metaphysics can only hinder its effort to orient us in the phenomenal world.<sup>55</sup> It would be wrong, however, to attribute to Husserl a position similar to any of the points of view discussed in Chapter 1, for, according to him, the fact that natural science should not set itself the task of knowing the ultimate nature of things only implies the necessity of another science, the science of reality *par excellence*,<sup>56</sup> the questions of which reside in a different level,<sup>57</sup> i.e., metaphysics. Clearly, Husserl is not embracing an *ignorabimus à la* Du Bois-Reymond, nor is he embracing any sort of “consciousness-idealism/positivism” *à la* Mach, nor is he embracing a moderate realism limiting our knowledge of reality to its structural/nomological component *à la* Helmholtz, nor finally is he embracing anything akin to what philosophers today refer to as scientific antirealism. If empirical sciences are not truly sciences of reality, if they merely afford knowledge of the laws allowing our orientation in the world of appearances, then a genuine science of reality *built upon their results* must be possible.<sup>58</sup>

Husserl is aware of the problematic relation that this wished-for science of reality *par excellence* would have with the existing empirical sciences. Indeed, it is for him out of the question that one can build metaphysics on the unrefined prescientific material of common sense. Furthermore, it is out of the question that its concepts can be innate. Thus, the only remaining option is that “metaphysics will have to edify itself on the empirical sciences.”<sup>59</sup> This conclusion, by itself, already indicates that, when Husserl downplays the ontological value of scientific hypotheses, he is not endorsing an antirealist position. If science had only a predictive-instrumental

value then it is hard to see how metaphysics could be built on its conceptual material. If that were the case, metaphysics, or, better, the part of metaphysics the aim of which is to determine the ultimate nature of the world, would have to draw its own concepts from a different source. As we have seen, this was Duhem's view, who believed that the aim of physical theory is not to access the inner truth about reality, and yet, *contra* Mach, admitted the possibility of a metaphysics of Aristotelian inspiration, i.e., one not formulated in the language of mathematical physics. As will be soon clear, if for Husserl some of the hypotheses scientists put forward (e.g., electric fluid) have only an auxiliary role in the quest for physical laws, this is not the case for all scientific postulations. The sketchy indications that we find in the remaining part of the text concerning how this "over-science" of reality should arise based on the results of the existing sciences will clearly show this.

Let us begin by remarking that a deleted footnote on page 245 nuances the preceding pessimistic claims regarding the epistemic value of natural science (in a manner warranting a more extended explanation). In this footnote, Husserl concedes that empirical science provides "a conception of the real world that, albeit in a distant, analogical way, may reach something about reality itself," and aptly characterizes this knowledge "pre-metaphysical." One could say that, thus conceived, empirical science constitutes an intermediate step between the prescientific and the metaphysical conception of reality. Scientific knowledge is thus affected by a higher order "relativity" than is ordinary knowledge in the sense that the latter follows motivations which are not fully theoretical and which therefore cannot originate in nor satisfy a genuine rationality. Yet, it does afford a first theoretical reshaping of the world of immediate experience that can function as the basis for the development of genuine knowledge of the world. Husserl's own view is precisely that scientific knowledge has a pre-metaphysical character.

Husserl immediately introduces a distinction among the assumptions accepted by natural scientists. The first group comprises assumptions that are tacit and, because they concern knowledge of reality as a whole, are necessary for all empirical sciences. All metaphysical assumptions about the existence of the world – its spatiotemporal and causal structure, etc. – fall in this group, as do assumptions pertaining to the theory of knowledge and to formal logic.<sup>60</sup> The second group comprises the specific hypotheses that science introduces to explain particular groups of phenomena:

[In the second group], there are particular assumptions of the individual empirical sciences, for instance, the different genera and species of molecules and atoms in their substantial particularities and groupings, the manifold types of longitudinal and transversal waves, the aether with its wonderful properties, in older time, the different

fluids etc. Here belong the particular laws of physics, chemistry, physiology, and so forth, insofar as they really are, as they are said to be, laws claiming to reach the real world.<sup>61</sup>

If these assumptions form part of the conceptual material on which metaphysics must arise, then they cannot be regarded as mere aids for the imagination in the quest for empirical laws. Rather, they are the pre-metaphysical knowledge that awaits elucidation by means of analyses of the general principles mentioned earlier. Husserl must therefore grant, in line with what he says in the deleted footnote, that there is a difference between the theoretical postulations of natural science. Some are merely auxiliary (such as the aforementioned electrical fluid) and, serving only the purpose of formulating physical laws, lack any metaphysical value, while others are already pre-metaphysical in character and, once purged of all difficulties and obscurities, can be carried over into the ultimate description of reality, i.e., into metaphysics proper. In the subsequent analyses of this problem, Husserl will focus exclusively on this second type of concepts and will not evoke (at least not to my knowledge) any other examples of purely auxiliary concepts in physics. In other words, Husserl will mention the conceptual material of science only as that which must be elucidated in order to yield a positive contribution to the ultimate knowledge of the world. This is the sign that the pre-metaphysical character of scientific knowledge will be increasingly emphasized, *contra* some of the overly deflationary claims contained in this lecture. Indeed, as we shall see in the next section, some remarks contained in the *Prolegomena*, written more or less at the same time, clearly show that such claims do not express any skepticism or agnosticism about the epistemic value of the science of nature, but only a harsh appraisal of how such science is in fact practiced.

This text remains vague, and even scarcely programmatic, on the specific relation between empirical sciences and metaphysics. However, at the end, we find a more general indication of the kind of analysis necessary to clarify the conceptual material of the sciences of nature and their epistemic value. Husserl gives a list of concepts that stand in need of clarification: "Thing and property, cause and effect, matter and energy, being and appearance, to come into existence and to decay, unity and multiplicity, space and time, etc."<sup>62</sup> We will see that this kind of research will constitute the basis of Husserl's more complete account of the philosophical interpretation of the sciences. Indeed, the study of these (among many other) concepts will pertain to the system of a priori ontologies (formal or material), which will play an essential role in Husserl's later theory of science.

Adding these results to the previous section, we now arrive at the first (albeit still incomplete) characterization of the two a priori investigations necessary for the metaphysical reworking of the sciences. The theory

of knowledge, by solving the problem of the objectivity of knowledge, determines the interpretation of the being of reality, which was the object of the controversy among the various “metaphysical convictions” of modernity, while more specific ontological research clarifies the a priori structures of empirical science. These two a priori investigations jointly provide the space of possibilities allowing the ultimate clarification of the specific empirical assumptions that the positive sciences make about the different domains of phenomena. One must keep this in mind in order to better grasp the few metaphysical considerations contained in the *Logical Investigations*.

#### §4. Natural Science and Metaphysics in the *Logical Investigations*

As is well known, during the early stage of Husserl's philosophical career, mathematics and logic take center stage. The *Logical Investigations* contain but a few sparse references to natural science and to its specific philosophical foundations. The latter fact is unsurprising, given that the aim of the *Logical Investigations* is to develop a phenomenological elucidation of pure logic conceived as the science of science or as the theory of science (*Wissenschaftslehre*),<sup>63</sup> at a moment at which, let us recall, phenomenology is still characterized as descriptive psychology. In other words, in contrast with the 1898–1899 lecture, the theme of a philosophical analysis is now logic, not the empirical sciences. Empirical sciences are in question primarily *qua* particular cases of sciences, i.e., with respect to their formal structure, and only secondarily in relation to their specificity as empirical sciences. The *Logical Investigations* make but a handful of scattered remarks even about the methods of logical foundation specific to the empirical sciences, remarks that are, nevertheless, worth briefly discussing.

Let us first remind ourselves of the way in which Husserl approaches the idea of science itself. The study of the essence of science in general is what characterizes pure logic as a science; therefore, this essence cannot be expressed in one formula. However, a general indication of the idea of science is stated by Husserl in the following, very traditional, terms. A science is, according to Husserl, ideally speaking, a system of truths about a unitary sphere of objects, unified by logical relations of foundation. Logic, therefore, is the science that deals with the formal structure of the unification of scientific truths. It is in view of clarifying the sense of this strong correspondence between *truth in itself* on the side of the theories and *being in itself* on the side of the objects (conceived in the broad formal-ontological sense)<sup>64</sup> that Husserl sets out to discuss the theoretical insufficiency of the sciences, i.e., the fact that they rely on unclear presuppositions. Understandably, since the *Logical Investigations* aim at the clarification of the *logical* aspect of science, which concerns the totality of scientific disciplines, the problem of the specifically *metaphysical*



presuppositions underlying empirical sciences only briefly surfaces in the *Prolegomena* and remains in the background throughout the following six investigations. This also explains why so many readers of the *Logical Investigations* have focused on metaphysical questions concerning the ontological status of ideal objects and on Husserl's so-called idealism concerning essences (which he refused to interpret in a traditional, metaphysical way).<sup>65</sup> In what follows, I will limit myself to discussing metaphysical issues in Husserl's own sense, i.e., those concerning the ultimate knowledge of reality.

This is the brief characterization of these presuppositions that we read in the *Prolegomena*:

Such presuppositions are, e.g., that an external world exists, that it is spread out in space and time, its space being, as regards its mathematical character, three-dimensional and Euclidean, and its time a one-dimensional rectilinear manifold; that all process is subject to the causal principle etc. These presuppositions, all to be found in the framework of Aristotle's First Philosophy, are at present ranked under the quite unsuitable rubric of "epistemology" [*Erkenntnistheoretische*].<sup>66</sup>

We find here a list of presuppositions concerning reality that we are already familiar with: not only the existence of the external world, but its mathematical-Euclidean spatiotemporal structure and the principle of causality. In light of what we already know, the claim that *these* presuppositions would find their place in Aristotle's *First Philosophy* should not be taken literally. To be clear, Aristotle does not speak about the existence of a world "external" to the mind. The point is rather that, at this stage, Husserl still tries to introduce the idea of metaphysics as the science that, unlike the different special sciences (in Aristotle's terminology, the second philosophies), investigates the general features of reality. Further, he believes that, in virtue of its thematic continuity with what Aristotle called first philosophy, this science should not be identified with the theory of knowledge or with any of its sub-disciplines. Husserl affirms what realist epistemologists of different orientations would have said at that time, namely, that the existence of an "external world" is a presupposition of science. Yet, he also goes further than many of them (further than Brentano for sure) by advancing the following two claims. First, that mathematical form belongs to the external world as such, i.e., the world is mathematical in itself, and not just our scientific representation of it; second, that Euclidean geometry provides this mathematical form for both space and time.

Husserl speaks of the mathematical structure of space and time as valid a priori, and yet, at the same time, as really inhering in the external world, as he had already done in the *Logik Vorlesung* (1896).<sup>67</sup> The

pre-Einsteinian character of these claims (that Husserl's subsequent formulations will only partially correct) will concern us later. For the moment, let us mention that towards the end of the *Prolegomena* Husserl, while illustrating the fruitfulness of the theory of multiplicity as a complement of *mathesis universalis*, declares once more that there is no doubt that Euclidean geometry is the only possible form of the phenomenal world. According to him, purely formal investigations can have positive repercussions on the clarification of "metaphysical" problems: the metaphysical problem in question is whether  $n$ -dimensional Euclidean spaces or Riemannian curved spaces can describe the spatial structure of the world, i.e., whether they can count as "geometries" in the real sense of the word. The theory of multiplicity will instead help us acknowledge that there is an infinite variety of categorial forms of spaces, among which only one corresponds to the real physical space, the only one pertaining to authentic geometry:

It would be easy to show that a knowledge of the true intention of such theories, as pure categorial forms of theory, would banish all metaphysical fog and all mysticism from the mathematical investigations in question. If we use the term "space" of the familiar type of order of the world of phenomena, the talk of "spaces" for which, e.g. the axiom of parallels does not hold, is naturally senseless. It is just as senseless to speak of different geometries, when "geometry" names the science of the space of the world of phenomena. But if we mean by "space" the categorial form of the world-space, and correlatively, by "geometry" the categorial theoretic form of geometry in the ordinary sense, then space falls under a genus, which we can bound by laws, of pure, categorially determinate manifolds, in regard to which it is natural to speak of "space" in a yet more extended sense.<sup>68</sup>

At this time, therefore, Husserl has moved away from the view defended in the *Raumbuch*, according to which the claim that space has a Euclidean form rested on empirical grounds and enjoyed only the degree of probability afforded by the exactness of the available measurements. It is also noteworthy that the expression "metaphysical fog" that appears in this passage does not designate the problematic intrusion of meaningless metaphysical considerations into the field of the foundation of geometry, designating instead the confusion concerning the genuine metaphysical problems about space that, according to Husserl, the theory of multiplicity can help remove.

So far, we have dealt with a few hints at the metaphysical foundations of natural sciences contained in the *Logical Investigations*. These sciences also require a methodological foundation, namely, what Husserl refers to in the *Prolegomena* as an extension of the idea of pure logic comprising a pure theory of probability as a "pure theory of empirical knowledge,"<sup>69</sup>

setting the a priori conditions of possibility of empirical knowledge. Section 72 of the *Prolegomena* states three important interrelated theses setting the task of the theory of natural science and casting light on the necessity of such a pure theory of empirical knowledge. (1) The intrinsic hypothetical character of experimental sciences and of their explanations require laws that can never be evidently true, only evidently probable.<sup>70</sup> (2) As soon as they enter the unity of an explanatory theory, the facts that such sciences set out to explain (and here Husserl implicitly refers to physics and chemistry) undergo a theoretical reshaping by virtue of which their objective being becomes thematic, as against the way they are immediately given to us.<sup>71</sup> (3) Finally, at all levels of the scientific exploration of reality, strictly rigorous methods must dictate the only legitimate way of evaluating theories, laws, and facts, methods that should leave no freedom of choice to the researchers.<sup>72</sup> This last demand specifies the aim of the pure theory of empirical knowledge. Although empirical laws and theories are intrinsically provisional, the process whereby scientists contrive and revise them must conform to ideal norms, as, according to Husserl, Descartes and Leibniz already acknowledged.<sup>73</sup> Given a certain body of experimental results, such norms should dictate what the best theory encompassing them is. As new evidence becomes available, the theory might well undergo a deep overhaul, but its old formulation remains rationally justified within the limits of the previously available evidence.<sup>74</sup> In our contemporary terms, Husserl is here setting the difficult task of solving also the so-called problem of the underdetermination of theory by empirical evidence.

It is interesting to notice how these three theses naturally stem, in this context, from an implicit confrontation with the ideal sciences, which, here, constitute the chief object of investigation. Indeed, in the context of, say, pure mathematics, axioms are evidently true and we can derive from them ideal states of affairs that find a place in the unity of a deductive theory without undergoing any essential modification. Instead, in the empirical exploration of nature, we aim at determining the nomological structure of a sphere of being, nature, which only exists in the form of individual facts (there is no direct intuition of empirical generalities) given in perception (and memory). This creates a kind of recursive interdependence between “facts” and “laws” that is lacking in the ideal sciences. On the one hand, we can obtain physical laws only by means of inductive/probabilistic inferences from a number of perceived facts, but, on the other hand, physical laws will help us reformulate the perceived facts in such a way that physico-mathematical magnitudes replace all perceived secondary properties. Given its importance for a correct understanding of the relation between the theory of knowledge, logic, and metaphysics, it is worth quoting this passage at length:

We start with such facts, they are taken as given; all that we want is to “explain” them. But when we rise to the explanatory hypotheses

and, after deduction, verification and perhaps repeated modification, accept them as probable laws, the facts themselves do not remain quite unchanged; they too change as the process of knowledge progresses. The added knowledge due to hypotheses that have proved workable, enables us to press ever deeper into the “true essence” of real being: we progressively correct our conceptions, more or less tainted with inconsistencies, of phenomenal things. Facts are originally “given” to us only in the sense of being perceived (and likewise in the sense of being remembered). . . . But, as knowledge progresses, the actual factual content that we concede to perceptual appearances gets altered. The intuitively given things – the things with “secondary qualities” – come to count as “mere appearances.” To determine the true element in them at a given time, or, in other words, to determine the empirical object of knowledge *objectively*, we need a method adjusted to the sense of this objectivity, and a field of scientifically known laws to be gained and steadily extended by this method.<sup>75</sup>

In the previous section, while discussing the 1898–1899 lecture, it appeared that natural scientists were not interested in determining the “essence” of reality in a metaphysical sense, that is, its inner being, but only in acquiring knowledge of empirical laws for the practical mastery of nature. In light of this passage, we can once more appreciate to what extent that claim concerned merely the focus of the researchers’ interest (or, at any rate, the prevailing interest), and not the way a science elucidated by pure logic, by the pure theory of probability, and, we are entitled to add, by the theory of knowledge, should work. Only such an “enhanced science” can have genuine metaphysical value, i.e., can count as genuine knowledge of factual being. Indeed, in point of right, knowledge of physical laws effects a progressive theoretical determination of the things as they appear in perception that leads closer and closer to their intrinsic nature.

If we recall Husserl’s account of theoretical explanation in the empirical sciences mentioned at the end of the previous chapter, we can appreciate that the “facts” that must be explained by natural laws, as soon as science overcomes the stage of merely observable regularities, are progressively re-described in those theoretical terms that ultimately require hypotheses about theoretical entities. It is, therefore, perfectly understandable that a metaphysical clarification of natural science will also comprise the evaluation of the ontological import of unobservable entities postulated in the course of this progressive determination of empirical facts. Such is the case, for instance, of atoms and molecules, as the 1898–1899 lecture already clearly indicated. This more applied problem, as we know, belongs in metaphysics.

Finally, there is an important passage contained in the introduction to the first edition of the *Logical Investigations* that deserves careful

analysis in that, once more, it sharply demarcates the theory of knowledge and metaphysics intended as the science of what is factually and ultimately real:

The question concerning the justification with which we assume “psychic” and “physical” realities different from our own ego, what the essence of these realities is and which laws they are subject to, whether the atoms and molecules of physicists belong to them, etc., is completely separate from the theory of knowledge. The question concerning the existence and nature of the “external world” is a metaphysical question. The theory of knowledge, on the other hand, as general clarification of the ideal essence or of the sense of knowing thought, does encompass the general question whether and to what extent a knowledge or a rational supposition of objects that are not themselves given in the lived experience of thinking [*im Denkerlebnis*], and are thus also not known in the eminent sense, is possible; not however the specific question whether we can really attain such knowledge on the basis of the data actually available to us, or even the task to achieve this knowledge.<sup>76</sup>

This passage expands on what is asserted in the lines quoted at the beginning of this section. Metaphysical questions concern the existence of the world, its articulation in general provinces of reality (such as the physical and the psychical), having their respective essence, and the specific types of entities and processes that populate them. Such truths are neither presuppositions of the theory of knowledge nor a part of its scope. The latter deals with the essence of knowledge, i.e., with the ideal possibility of knowledge. In particular, it will also concern the essence of the knowledge of objects that are not known in “an eminent sense,” i.e., that are not lived experiences or any of their components, such as the world and its constituents. The concluding lines of this quotation clarify that the theory of knowledge does not take into account matters of fact at all, not even to determine whether the evidence *de facto* available makes the knowledge of the world possible, let alone achieves such knowledge. In short, the theory of knowledge does not presuppose the *de facto* existence of the world and of what it contains, nor does it put forward claims about it or about our *de facto* possibility to arrive at it. These conclusions are all carried over to phenomenology, as the ground of all problems pertaining to the theory of knowledge.

However, this passage should not be taken to imply that Husserl, in contrast with his earlier view, has come to believe that the theory of knowledge, as well as the phenomenological description of lived experiences on which it rests, *do not have anything to do* with metaphysics. This would be wrong for two reasons. First, as we know, in these years,

Husserl calls “metaphysics” the ultimate knowledge of reality resulting from the philosophical elucidation of the sciences. Now, since the theory of knowledge is necessary to carry out such elucidation, it cannot be totally unrelated to metaphysics in this sense. On the contrary, its application to the *de facto* existing sciences in view of this elucidation is a fundamental desideratum of Husserl's theory of science. Second, such elucidation requires also a solution to the controversies that have motivated the different positions mentioned in the 1898–1899 lecture, namely, realism, idealism, etc., which Husserl calls, likewise, “metaphysical.”

As we know, this solution, for Husserl, presupposes the formulation of a correct theory of knowledge. Unfortunately, Husserl, in contrast with what we read in that lecture, does not mention here the intrinsic dependence of these metaphysical positions on the theory of knowledge. Thus, by focusing solely on the *Logical Investigations*, the reader is bound to overlook the fact that the theory of knowledge being elaborated is also the terrain on which one should answer the questions that had motivated such classical metaphysical positions, all of which had to do with the relation between the knowing subject and the world. Their questions must in turn be answered in view of the ultimate elucidation of the factually existing world. What is true is that the theory of knowledge is unconcerned with any factual truth about the world, and that, in principle, its claims would hold even if we lacked any actual evidence that anything other than our own consciousness exists. Yet, this does not mean that the theory of knowledge would have no consequence for the choice between, say, phenomenalism, realism, or Kantianism. The so-called and much disputed metaphysical neutrality of the *Logical Investigations*, in other words, consists in the absence of metaphysical presuppositions of the theory of knowledge and in the exclusion of questions concerning the existence and nature of the world; but it does not amount to the thesis that a phenomenological theory of knowledge *does not have any consequence* for our conception of the nature and existence of the world.<sup>77</sup> Indeed, for Husserl, the fundamental philosophical motivation of the theory of knowledge has always been metaphysical, although such discipline is needed also for the elucidation of purely formal knowledge, which, by itself, does not directly concern the real world. Furthermore, as already anticipated (see Chapter 2, §2), the theory of perception developed in the *Logical Investigations* undercuts the phenomenistic reduction of reality to complexes of sensations.<sup>78</sup> This fact already illustrates, at least in a negative way, how the theory of knowledge can contribute to the metaphysical clarification of the ontological form of reality, and, thereby, of the individual results of the empirical sciences.<sup>79</sup>

It would likewise be wrong to suggest that the *Logical Investigations* already marks a modification of the point of view presented in

the 1898–1899 lecture, for, as we shall see in the next section, in the years following the publication of his great work, Husserl reasserts the close connection between the phenomenological theory of knowledge and the traditional metaphysical questions concerning the general ontological form of reality. The recognition of this fact will be extremely important in understanding how transcendental phenomenology takes up and transforms Husserl's earlier metaphysical concerns. What is true, however, is that, in these years, Husserl's terminology is still unstable. Furthermore, it is unlikely that, at the time of the *Logical Investigations*, Husserl already had a clear idea about *how* his theory of knowledge would provide the means for a general elucidation of being able to overcome the traditional metaphysical positions. Indeed, if it is true that he does not explicitly subscribe to any of them, it is also true that he does not explicitly reject them. That does not happen until after the transcendental turn.<sup>80</sup>

Finally, let us note that, as was already the case in the 1898–1899 lecture, in the *Logical Investigations* the a priori claims concerning the essence of the world (e.g., concerning its spatial, temporal, and causal structure), which were indeed mentioned in the quotation opening this section, do not make up a delimited field of research. There is still no a priori science of reality studying what is true a priori about the world. As we are about to see, Husserl's writings in subsequent years overcome this limitation.

### §5. The Metaphysical Closure of the Empirical Sciences in the Years of Husserl's Transcendental Turn and an Indication of the Investigations Necessary for It

Shortly after the publication of the *Logical Investigations* (in the course *Logik 1902/03*<sup>81</sup> and in the *Allgemeine Erkenntnistheorie Vorlesung 1902–03*<sup>82</sup>), Husserl repeats the central claims concerning the relation between the theory of knowledge and metaphysics found in the 1898–1899 lecture. For more interesting formulations, we can start by consulting the *Urteilstheorie Vorlesung 1905*:

Pure logic and theory of knowledge is, so we might straightforwardly say, formal metaphysics, insofar as, under the abstraction from the particularities in which being presents itself in the specific sciences, it investigates the forms and types of lawfulness belonging to the idea of being in general, and thereby clarifies the ultimate sense of being [*den letzten Sinn des Seins*] and the corresponding correlations to signification and thought. Material metaphysics, instead, determines on the basis of the theory of knowledge, what now factually exists and how it is; it asks not merely what is essential to being in general

and as such, but as what the *de facto* existent reality [*das de facto Seiende*] according to the respective results of the specific sciences of being has to count.<sup>83</sup>

If metaphysics is the science of real being in the true and ultimate sense, then the theory of knowledge is the precondition of metaphysics. The theory of knowledge is the formal science of being, insofar as it leaves out of consideration being as it factually presents itself in the research about being of the specific sciences, and investigates being in general according to its essential sense.<sup>84</sup>

This formulation is even stronger than the one contained in the 1898–1899 lecture. If Husserl previously claimed that some questions pertaining to the theory of knowledge are already metaphysical insofar as they determine the metaphysical positions about the relation between the subject and the world, he is now going so far as to call the theory of knowledge, along with pure logic, *formal metaphysics* or the *formal theory of being*. In addition, Husserl calls *material metaphysics* the elucidation of what factually exists. These two passages together show the continuity of Husserl's thought before and after the *Logical Investigations*. They also show to what extent the formulation we find in the *Logical Investigations* only partially reflects Husserl's ideas at the time.

Metaphysics comprises both the general characterization of being and the elucidation of what in fact exists, as it did in the 1898–1899 lecture. It is also clear, from these two passages, that the term metaphysics is more adequate for the latter, since Husserl adds that formal metaphysics or the formal theory of being is only a precondition for metaphysics. Yet, this time, the term is used without qualification. This reflects Husserl's general tendency to consider what here he refers to as “material metaphysics” to be metaphysics proper. It is also noteworthy that the theory of knowledge *qua* formal metaphysics is said to clarify the “ultimate sense of being” of what exists. In 1905, Husserl is already developing his transcendental approach and “sense of being” becomes a much more fitting expression to designate the problems that were dealt with by the traditional “metaphysical positions,” positions that Husserl will soon explicitly denounce as meaningless. The 1905 lecture is thus an important step on Husserl's philosophical journey, for it sheds light on the underlying continuity of Husserl's thought and allows us to set the *Logical Investigations* against the wider background of his views about the relation between the phenomenological theory of knowledge and metaphysics. It is also important because it shows that Husserl's terminological oscillations have obscured the fundamental continuity of his ideas. If one follows the Aristotelian idea of metaphysics as the science of being in general, as Husserl was tempted to do in these years, one may regard the theory of knowledge (as well as formal logic) as the formal, a priori part of metaphysics. This is



evident in the 1905 lecture. However, Husserl was also persuaded that, at bottom, metaphysics in the authentic sense is the ultimate science of what *de facto* exists. This explains why in the *Logical Investigations*, as well as in all the texts written after 1905, he settles for a sharp demarcation between the purely formal theory of knowledge and metaphysics of factual being. Subsequently, Husserl will drop for good the terminology introduced in the 1905 lecture.<sup>85</sup> Yet, this decision of terminology does not change the fact that the theory of knowledge, far from being unrelated to metaphysics, provides the basis for it.

Unfortunately, in the course *Introduction to Logic and to the Theory of Knowledge of 1906/1907*, Husserl modifies his terminology yet again, and in a way that engenders further confusion. Now, formal logic and the theory of knowledge are no longer called “formal metaphysics.” This term, as we shall now see, is reserved for the a priori (eidetic) science of reality. In other words, formal metaphysics becomes an objective a priori discipline of reality. In this course, Husserl further develops his idea of a philosophical completion of the empirical sciences. By reworking a great deal of the material contained in the *Logical Investigations* and in the other previously mentioned texts, he introduces two interrelated advances: an early characterization of the phenomenological reduction as essential to the theory of knowledge<sup>86</sup> and a more developed treatment of the aspects of the theory of science that concern the empirical sciences. These two advances are interrelated because Husserl’s way of dealing with the relation between science and reality will not assume a definite form until the notions of transcendental reduction and constitution are established. After introducing the idea of pure logic as *mathesis universalis*, the formal theory of science as comprising the totality of formal a priori disciplines necessary for the development of any type of scientific knowledge, and before introducing the idea of the theory of knowledge as the phenomenological elucidation of the totality of the a priori disciplines pertaining to the sciences, Husserl presents, in Chapter 3, an analysis of the tasks of the theory of science in regards to empirical sciences. Once more, we do not find such analysis in the *Logical Investigations*, although it was prefigured in the 1898–1899 lecture. Furthermore, the last chapter of these lessons contains an analysis of the specific logical and methodological problems pertaining to the sciences of nature, problems only briefly evoked at the end of the *Prolegomena* in the section about the extension of the *mathesis universalis* to the pure theory of probability.<sup>87</sup>

As usual, Husserl begins by denouncing the incompleteness of the empirical sciences. Sciences, *prima facie*, are so many ontologies, for they investigate different portions of real being,<sup>88</sup> and, in principle, the ideal totality of all empirical sciences should be able to provide a complete satisfaction of our theoretical interests in reality. Yet, once more, Husserl warns us that this is not the case. This time, the conceptualization is

more familiar to the readers of the later, much more famous, phenomenological discussions of scientific knowledge. Scientists operate within the “basic model of the natural reflection of the world”<sup>89</sup> without submitting it to a radical critique that only an analysis of the subjective activities in which objectivity gains legitimacy can provide. Their goal is the practical mastery of nature and consists in “formulating laws by means of which we exactly foresee and predict the course of empirical processes.”<sup>90</sup> Let us notice that the expression “basic model of the natural reflection of the world” translates the German “*Grundschema der natürlichen Weltbetrachtung*.” In *Ideas I*, the expression “*Weltbetrachtung*” will refer to the consideration of the world effected in the natural attitude,<sup>91</sup> while, as we have seen, in the 1898–1899 lecture, Husserl had spoken of the “prescientific conception of the world” characteristic of the “natural man.” Thus, we are witnessing here a further advance in the gradual development of the fundamental concept of the natural attitude.

Husserl then outlines what, following his suggestion, we can call the *pre-metaphysical* character of natural-scientific knowledge:

In memory of the much loved Kantian theories, which natural scientists do not by any means tend to understand, they employ the word “phenomenon”, phenomenal thing, phenomenal world, and the like. Things are mere appearances, behind which true Being, the thing-in-itself, is supposed to lie. Now, we have not to debate and to decide here how much truth is to be looked for in this. In any case, it is certain that the knowledge of the world of the natural sciences, even the most highly developed ones, is not definitive knowledge of reality. This is most blatantly apparent in the fact that, while different natural scientists by no means call into question the theoretical content of the sciences developed, they immediately part ways as soon as they themselves begin to reflect on the definitive interpretation of the truth of what it dictates. Therefore, the same science with the same equally recognized stock of theories is yet open to different “interpretations”. Some declare themselves Materialists, others Idealists, a third party a Positivist or Psychomonist, while a fourth party discovers ultimately conclusive truth in the energetistic interpretation of the world.

In possession of exact mechanics, acoustics, theory of electricity, etc., we are, nevertheless, not yet in possession of definitive knowledge, of ultimate, conclusive knowledge of the essence of nature, and the fact is *that nothing of this is changed by the progress in the natural sciences*.<sup>92</sup>

In the first lines of this passage, Husserl blames working physicists for adhering to a sort of “Kantianism for the masses” according to which

the objects of their theoretical and experimental research (not only the objects of immediate experience, but also their theoretical “reworking” in terms of electrical currents, magnetic fields, gravitational forces, etc.) are not themselves parts or aspects of reality, but “phenomena,” i.e., ways in which *reality* manifests itself to us. Present-day scientists (as opposed to the founders of modern science such as Galileo and Descartes) believe that their discoveries have value only for a realm of “phenomena” which they take to be amenable to a rigorous determination. As soon as scientists try to evaluate the epistemic import of their theories *qua* tentative representations of reality itself, their agreement suddenly comes to an end. Different and incompatible interpretations arise, among which no amount of empirical knowledge can aid adjudication. The ontological interpretations mentioned here are four: materialism, idealism, positivism, and energetism. This time, positivism is opposed to idealism (presumably, Husserl is referring to some form of traditional metaphysical idealism to be distinguished from the “consciousness-idealism” of Mach and Avenarius, i.e., with what he now calls “positivism or psychomonism”). As we know (see Chapter 1, §1), materialism had been a popular doctrine in the 19th century while energetism (see Chapter 1, §2) was a more recent trend introduced first as a physical hypothesis and then as a general metaphysical point of view by the chemist Ostwald. Once more, Husserl’s point is that the existence of a multiplicity of interpretations is due to the lack of clarity concerning the methodological and conceptual foundations of science.<sup>93</sup>

If no amount of scientific research can settle these issues, and if, as Husserl does, we refuse any skeptical standpoint on them, then there must be a “higher tribunal” able to rule on the matter, i.e., to endow the results of natural science with a final *interpretation*. Once more, Husserl calls the science of being in the ultimate sense metaphysics, or the science of *ontos on*.<sup>94</sup> But the sense in which we are confronted with a *higher* tribunal should not be missed. This text highlights even more markedly than the previous texts that the metaphysics in question is not a wholly separate science. It is not even a discipline built upon natural science somehow in the way in which the kinetic theory of heat is built upon thermodynamics, i.e., by supposedly seeing through thermic phenomena and accessing their inner nature. That kind of movement from “phenomena” to “underlying reality” takes place within science and is not mimicked at the highest level by a science able to gain a deeper insight into reality. Metaphysics, in this sense, is not a “hyper-physics” that takes as its starting point the theoretical descriptions of the world provided by science, and, by piercing through them, reaches for the inner essence of things. Instead, “it arises through a certain critical investigation of the ultimate meaning and value of the theoretical foundations of the empirical sciences, through elucidating and ultimately

securing them."<sup>95</sup> Thus, Husserl, without hesitation, can speak of an *empirically grounded metaphysics*, or a *posteriori metaphysics*.<sup>96</sup> This amounts to much more than merely the claim that the ultimate science of reality must take empirical knowledge into account. This indeed would also be the case for Duhem and, in a completely different way, for Schopenhauer. Husserl believes, as we shall see, that what is not a priori valid in any possible nature, what is factually true in the existing nature, can be discerned only by means of a philosophical elucidation of natural science.

The 1898–1899 lecture already prefigured the two directions, subjective and objective, of this critical activity. The subjective direction consisted in going back to the sources of knowledge and, without accepting the general assumptions underlying prescientific life, elucidating how the results of the subject's operations acquire objective validity. In the 1906–1907 lectures, Husserl takes a step towards the final characterization of this subjective direction as now involving the suspension of the natural attitude and the ensuing systematic analysis of the subject's intentional activities as well as of their evidential character. On the other hand, in the 1898–1899 lecture, just like in the *Logical Investigations*, Husserl pointed to objectively directed analyses concerning the essences corresponding to the most important notions of science, not only the formal ones, such as unity and multiplicity, but also the ones pertaining to reality, space-time, cause and effect, etc. However, it also appeared that, in both texts, these analyses were not taken up by a unitary and autonomous discipline different from both the theory of knowledge and the properly metaphysical investigations concerning factual truths. This second type of inquiry now finds its place among the disciplines contributing to the critique of science under the heading of the *a priori metaphysics of reality*, which is said to consist in the "necessary foundation of the empirically grounded metaphysics of actual reality."<sup>97</sup> Husserl characterizes this discipline as the systematic investigation of "the truths grounded in the essence of real Being as such."<sup>98</sup> It is an a priori ontology, but not a *purely* formal one, for it does not deal with the empty and general notion of being as the object of true predications. Interestingly, this a priori metaphysics of reality already comprises disciplines such as a priori kinematics and Euclidean geometry, i.e., the usual "a priori" parts of physics that Husserl will evoke virtually in all his various introductory texts to phenomenology and which will become components of the regional ontology of material nature. Doubtlessly, this research anticipates the idea of the different material ontologies *qua* special ontologies pertaining to fundamentally heterogeneous categories of objects. However, the articulation of reality in different regional ontologies does not yet appear at this stage. Reality is treated as one single domain having a general a

priori, which, regretfully, is also called “formal.” Yet, “formal” here refers to the a priori structure of reality in general, not to the empty form of “any object whatever.” A priori ontology is thus either purely formal (formal ontology) or metaphysical (a priori ontology of reality). The following passage shows to what extent Husserl is struggling with the terminology, but also how the sense of his choices is coherent with the underlying conceptual development:

The *a priori* ontology of the Real is, we could again say, formal metaphysics, though, the term is better avoided. Metaphysics in the authentic sense is material metaphysics. The former, we could further say, is *a priori*, the latter, *a posteriori* metaphysics. The former is prior to all empirical sciences; the latter comes after the empirical sciences.<sup>99</sup>

In the first sentence, Husserl claims that this a priori metaphysics could be named “formal” inasmuch as it does not refer to any specific actual reality, but only to the non-empty “form” of reality. The second sentence warns the reader that metaphysics, in the authentic sense, is concerned not just with reality, but also with *factual* (here = “material”) reality. At least, this is the unusual sense of “material” that this passage seems to imply, given that it is based, as the subsequent sentence indicates, on the double opposition between what Husserl considers the two parts of metaphysics, namely, formal/material and a priori/a posteriori.<sup>100</sup> From this text, it is already clear that Husserl hesitates to employ the word “metaphysics” for a priori (later to be termed “eidetic”) disciplines, and, actually, in subsequent years he will refrain from doing so. As I have anticipated at the beginning of this section, this use of formal metaphysics clashes also with the *Urteilstheorie Vorlesung 1905*, where “formal metaphysics” was used to indicate formal logic and the theory of knowledge while the label “material metaphysics” refers in both cases to the elucidation of factual existence.<sup>101</sup>

In conclusion, in the 1906–1907 lectures, it appears that the critical activities required to develop the ultimate ontology of what *de facto* exists, i.e., empirical or a posteriori metaphysics, are the theory of knowledge and the a priori metaphysics intended as the a priori ontology of real being. To these disciplines, Husserl also adds logico-formal ontology, which “provides a substructure to this metaphysics inasmuch as it is really obvious that what belongs to Being as such, also belongs to real Being.”<sup>102</sup> The latter type of inquiry, with which we are already familiar, will not be the central concern of the next sections of this chapter precisely because it was already developed in the years preceding Husserl’s transcendental turn. I will focus, instead, on the way in which the first type of inquiry will be taken up by the phenomenology of reason and the second by the different regional ontologies. I will also

stress that, in the subsequent years, when Husserl develops his more mature terminology, he will not establish a systematic parallel with his early employ of the word "metaphysics" (although, as we shall see, this term will be present in most of his major works). This fact has obscured the connection between the theory of constitution from *Ideas I* onward, and Husserl's own original quest for a metaphysical closure of the empirical sciences.

In the next sections, we will see how Husserl's early preoccupation with the metaphysical interpretation of natural science is carried over to the later analyses formulated in the terminology familiar to the readers of *Ideas I* and of *Cartesian Meditations*. In this exposition, I will begin by following Husserl's developments along the objective line of inquiry, and, consequently, I will first present the notions of ontological region and regional ontology. Subsequently, I will move to an outline of transcendental phenomenology as the universal ground for the solution of all epistemological problems. It will appear that this choice only apparently reverses the intrinsic hierarchal order of philosophical disciplines.

## §6. Regional Ontology

It is one of Husserl's central tenets that the single most important feature of any science consists in its object, and that to different types of objective domains correspond different methods. Given that these objective domains make up the various provinces of the world, the philosophical reflection on the world and on its intelligibility cannot sidestep the question concerning how these domains are to be acquired and what their mutual relations are. This is the fundamental theme of "regional ontology" and "ontological regions," which I will outline in this section and which constitutes an investigation necessary for the metaphysical completion of the empirical sciences.

As noted by Ursula Panzer, the term "ontological region"<sup>103</sup> appears for the first time in the lecture that Husserl gave in the winter semester of 1908–1909 entitled *Grundprobleme der Ethik*. Surprisingly, Husserl does not introduce it to distinguish the object-domains of the different sciences but to characterize the even more radical gulf separating the objective correlates of theoretical and axiological reason.<sup>104</sup> In a text written in view of a lecture delivered in 1910–1911 and published as the *Beilage XVII* of the Husserliana volume *Logik und allgemeine Wissenschaftstheorie*, instead, we find a fairly developed terminology, but one which still echoes the language of the preceding analyses. If I now briefly indulge in this formulation before turning to the first book of *Ideas I*, where Husserl's ontological terminology reaches what is, by and large, its final form, it is because it contains some illuminating claims and helpful historical references.

In 1910–1911, Husserl explores once more the possibility of extending the *Wissenschaftslehre* (or the *Wissenschaftstheorie*) beyond pure logic conceived as the formal theory of meaning (or “formal apophantic”) and formal ontology. As we know, the truths of pure logic constitute moments of the essence of any science whatsoever. To make an example belonging to formal apophantic, no science could ever exist without judgements, or without conjunctions and disjunctions. On the side of formal ontology, it is easy to recognize that ideas such as objects, properties, relations, and numbers are necessary for any objective domain of any science. Husserl also remarks that this idea of logic admits of no further extension and that it is “analytic is so far it brings to pure development a prominent tendency of Aristotle’s analytic.”<sup>105</sup> The extension of the doctrine of science is carried out by means of the inclusion of what is necessarily presupposed by at least one particular science, rather than by any science whatever.<sup>106</sup> Consequently, one has to drop the abstraction from all “material” elements, abstraction that characterizes pure logic, and turn to disciplines that are not purely analytical but refer to specific types of objects. To begin with, Husserl mentions *non-analytic mathematical* disciplines (or *synthetic-mathematical* disciplines) such as geometry (or the doctrine of space) and chronology (or the doctrine of time). These disciplines belong to the theory of science because, relative to a specific area, they behave like “formal disciplines.” Here we encounter again the relativized sense of the word “formal,” which, in the 1906–1907 lectures, Husserl had used for the a priori ontology of reality (or a priori metaphysics) without however differentiating among different regions of reality. This sense of the word “formal” allows Husserl to establish a parallel with Kant’s terminology:

Just as the objectivities, which the title “nature” comprises, are indeed objectivities—subjects of properties, reference points of relations, members of connections, parts of wholes – in short: they have an analytic-ontological form by virtue of which they are subject to the Analytics, nature as such has a form. Kant spoke of *natura formaliter spectata*. Anything that deserves the name thing has a corporeal form that fits into the space having the formal properties of a three-dimensional Euclidean manifold and, thus, requires the familiar geometry as the unfolding of its essence. Furthermore, every thingly being has its duration and has its mobility in space and is therefore subject to chronology and the pure theory of motion (phoronomy), as far as the time-forms and forms of movement are concerned.<sup>107</sup>

In this passage, Husserl insists on the idea of the general “form” of nature, which encompasses spatial forms (or shapes), temporal forms, and cinematic forms as so many moments. The term “form” allows a

connection between Husserl's ontology of nature and Kant's notion of "*natura formaliter spectata*"<sup>108</sup> To the synthetic-mathematical disciplines that pertain respectively to space, time (here called *chronology*, but sometimes also called *chronometry* to convey its parallelism with geometry), and movement (the latter is called, as in Kant, *phoronomy*), and that were already hinted at back in the 1898–1899 lecture (see Chapter 2, §3),<sup>109</sup> Husserl adds the specific "pure science of nature,"<sup>110</sup> which investigates the a priori of the material-real and causal aspect of physical events. This theme is slightly more developed in the lecture course *Grundprobleme der Phänomenologie*, where Husserl specifies that this "Kantian" discipline has so far remained, by and large, a desideratum,<sup>111</sup> given that just a handful of its propositions have found application in the real development of physics, such as the impenetrability of bodies, the necessity for a body to move on a continuous trajectory (without leaps), and the principle of causality.<sup>112</sup> It is important to stress that it is the part of Husserl's a priori ontology of nature dealing with material-real aspects of nature that corresponds to Kant's pure science of nature. As noted by Iso Kern, the distinction within the ontology of nature between, on the one side, geometry, chronology, and phoronomy, and, on the other, the eidetic doctrine of materiality corresponds, for Husserl, to the distinction between Kant's transcendental aesthetic and transcendental analytic.<sup>113</sup>

In this text, the concept of ontological region is introduced in relation to the different groups of possible sciences. To each ontological region there corresponds a "regional concept." Further, within each region, we can identify the "*Kardinalen Grundbegriffe*," which Husserl calls "categories," in connection with both Aristotle and Kant.<sup>114</sup> In the case of the region physical nature, the regional concept is "*Naturding*," and the categories are the fundamental concepts on which the different branches of the regional ontology of physical nature are built (space, time, and causality) and that consist of a "pendant," within this region, of the "analytic-formal categories of being in general."<sup>115</sup>

Husserl also indicates two reasons why the task of delimiting the various regions of being has not been carried out yet.<sup>116</sup> Both are worth mentioning for they hint at fundamental themes within his thought. The first is the prestige of the physical sciences themselves, which have incited the reduction of all real being to nature. This remark connects Husserl's notion of regional ontology with his critique of naturalism; and, in a different sense, so does the second reason mentioned by Husserl, which points to the complex interplay between ontological and transcendental phenomenological research. In virtue of such interplay, Husserl claims that it is impossible to grasp the distinction between the different regions of being without interrogating their distinctive mode of givenness, i.e., without studying their transcendental constitution.<sup>117</sup>



It is therefore not surprising that no clear delimitation of the different regions of reality was possible before the development of a transcendental phenomenological theory of science. Indeed, the relation between phenomenology and ontology is probably the single most important “theoretical knot” of Husserl’s philosophy, the full solution of which would be tantamount to a complete outline of phenomenological philosophy itself. By following the path opened up by the consideration of this interplay, we can now transition to the well-known ontological analyses that open *Ideas I*.

In the texts thus far considered, little is said about how the partitioning of being into different regions should be made. In *Ideas I*, Husserl follows a different strategy. Instead of taking as his point of departure the possibility of extending the doctrine of science beyond the “analytic” domain, he introduces, from the outset, the notion of ontological region in the framework of the correlation between different types of giving intuitions, on the one hand, and different regions of being, on the other. This is a correlation that the conversion to the transcendental attitude will reveal as an asymmetric relation in virtue of which the different modalities of giving intentional acts appear as the *sources* of corresponding types of real being constituted in transcendental consciousness. In this way, the problem of the identification of the ontological regions is brought to its ultimate, authentic ground, i.e., the phenomenological.

There is, therefore, a fundamental correlation between the various domains of reality, collectively making up the totality of the world (as a correlate of the theoretical attitude), and the systems of intentional activities on which the theoretical results of the different sciences ultimately rest. Thus:

To each science there corresponds an object-province as the domain of its investigations; and to all its cognitions, i.e., here to all its correct statements, there correspond, as primal sources of the grounding which validates their legitimacy, certain intuitions in which objects belonging to the province become themselves-given as existing, and at least some of them *given originally*.<sup>118</sup>

In the case of nature, the domain of natural sciences, the intentionality originally presenting the individual object is perception (transcendent perception). The world of the theoretical attitude, consequently, includes all the objective domains of empirical facts investigated by the different sciences. Among the latter, the main distinction is that between natural sciences and social and cultural sciences. In *Ideas I*, Husserl introduces the notion of region and regional ontology in the following way:

Any concrete empirical objectivity finds its place within a *highest* material genus, a “region,” of empirical objects. To the pure regional

essence, then, there corresponds a *regional eidetic science* or, as we can also say, a regional ontology.<sup>119</sup>

We need to distinguish between the *pure regional essence*, also called *regional eidos*, which is the highest material genus under which the empirical objectivity in question falls, and the *regional ontology*, i.e., the eidetic science whose task is to formulate all truths rooted in the regional essence as well as in its essential ramifications. The regional ontology is a science that aims at formulating synthetic a priori truths about all possible objects belonging to a given region. For instance, material nature is the ontological region to which any actually existing individual, material object, or thing belongs. Therefore, nature, taken as a whole, is the domain of factual existence, of factual individual matters of facts, and just as any of these individual matters of facts has an essence insofar as some of its properties can be modified without altering the essential type of objects it instantiates, nature itself has a contingent factual existence and an essence. Material nature would still be material nature if planet earth did not exist or if it had two natural satellites: empirical individual existences are completely contingent and thus extra-essential for nature. More interestingly, material nature would not turn into something essentially different even if the laws of nature governing its phenomena were not the same. It would still be *a* material nature, just endowed with a different internal causal regulation. In other words, there is no a priori necessity that the equations governing material nature be the ones that in fact obtain.

Husserl highlights this fact by distinguishing between the universality of natural laws and eidetic universality. As an example, he contrasts a law such as “All bodies are heavy” with a law such as “All material things are extended.”<sup>120</sup> The first law does not posit any individual factual existence, but it does posit the factual existence of nature itself. In other words, it is true in *this* nature, the one actually existing, that all bodies are heavy. The second law, instead, while being true also in this nature, holds also if “the positing of factual existence, carried out on the side of the subject, is suspended.”<sup>121</sup> In such a case, it becomes a *purely* eidetic proposition deriving from the essence of material thing. Hence, let us suppose that there happens to be a physical object. Its existence is contingent; and yet, given that it exists, the fact that it is extended is a priori true. This is an example of what Husserl calls an *eidetic necessity*, i.e., “a particularization of eidetic laws.”<sup>122</sup>

The upshot of such considerations is that what is true for an individual matter of fact, namely, that it has a stock of essential properties (without which it would not be the kind of fact that it is), is true also for material nature as a whole. It is therefore possible to *rationalize* the concept of nature, to purify it from all empirical contingencies so as to obtain the *eidos* of material nature, which prescribes rules that must hold for any possible

material nature whatever. All eidetic truths pertaining to material nature and its ramifications are material or synthetic a priori laws belonging to the corresponding regional ontology. These laws will concern not only the ultimate objects of the region, but also all the categorically structured objects derived from them: properties, relations, states of affairs, etc.<sup>123</sup>

The distinctions here briefly recalled are, of course, necessary for what Husserl regarded as the important task of classifying the sciences. Admittedly, only a mature transcendental phenomenology (and not an initial breakthrough, as Husserl often characterizes his own philosophy) would allow, according to Husserl, a perfect insight into the ultimate partitioning of the world into ontological regions. Yet, in this respect, Husserl's position has evolved, at least when considered from a purely methodological point of view. As we have seen, Husserl had maintained that it would be impossible to acquire a reliable insight into the different material ontologies without the aid of phenomenology.<sup>124</sup> Subsequently, however, considering to what extent the formal ontologies could grow on their own, unaided by constitutive analyses, and could formulate countless eidetic distinctions without reference to the mode of givenness of the corresponding classes of objects, Husserl makes the following concession:

Now, as for ontology, it is quite conceivable that someone can actually execute such a perfect insight that he, e.g., is able to analyze the essence of mind or of nature purely and completely, is able to fix the axiomatic principles that belong to it. But *de facto*: what we succeed so well in mathematics does not turn out successfully for us in the same way in the real ontologies. Here only phenomenology educates us to complete seeing, and although what it strives for is not eidetic doctrine of realities but rather of the constitution of reality and on the other hand of the pure Ego and Ego-consciousness in general, nevertheless, the full eidetic grasp of the real itself, and with it the grounding of ontology according to categorial concepts and principles, will come about only in communion with it.<sup>125</sup>

Husserl now makes the interesting move of considering regional ontologies themselves as sciences that in principle could be developed naïvely, without the firm ground of a phenomenological theory of knowledge supporting them, as is the case for formal eidetic sciences such as arithmetic as well as for the empirical sciences. The historical fact that this did not happen (and, most assuredly, will never happen) is imputed to the difficulty of blindly “bumping” into the correct regions and categories of reality without the eidetic seeing that arises in the transcendental attitude and that allows the description of how the different layers of reality, so to speak, grow out of consciousness. An example illustrating how these correlative procedures work will be provided in Chapter 4 while discussing the mathematization of nature in *Ideas II*.

§7. Transition to Transcendental Phenomenology:  
The Ontology of Nature as Explication of the  
General Formal Sense of What Is Posited by  
the Natural Attitude

Let us reconsider how, subsequent to the *Logical Investigations* at least, Husserl locates the main source of the incompleteness of the natural sciences in their uncritical acceptance of a “basic model of the natural reflection of the world.” As already indicated, we witness here an ancestor of the concept of the natural attitude and of its fundamental thesis.

As we now know, to each science (or homogenous group of sciences) there corresponds a region of objects and an originally giving experience in which its individuals are given. However, the presence of originally giving experiences of a certain type in the stream of lived experiences does not by itself suffice to define that general thematic orientation of the intentional life, which is required to pursue the corresponding scientific interest, i.e., for theoretically determining the class of objects given in those experiences. The natural scientists, for instance, busy themselves only with the natural aspects of the realities surrounding them; but they never cease to experience their surrounding world as shaped by culture, as endowed with value predicates of different kinds. Those experiences and their corresponding objectivities are bracketed; they remain unthematic. Husserl calls this state of affair, this thematic orientation of our intentional life, an *attitude*. For instance, the natural scientist works in the *naturalistic* attitude, while the social or cultural scientist must take up the *personalistic* attitude. In *Ideas II*, where much more is said about the attitudes pertaining to the different groups of sciences, we find a characterization of this shift, which implicitly contains also a definition of what an attitude is: “A change in attitude means nothing else but a thematic transition from one direction of apprehension to another, to which correspond, correlatively, different objectivities.”<sup>126</sup>

Yet, the attitudes characterizing the different groups of positive sciences of reality presuppose a more fundamental attitude, which also underlies prescientific life. This is the natural attitude.<sup>127</sup> Husserl famously characterizes the natural attitude as follows:

As what confronts me, I continually find the one spatiotemporal actuality to which I belong like all other human beings who are to be found in it and who are related to it as I am. I find the “actuality,” the word already says it, as a *factually existent actuality and also accept it as it presents itself to me as factually existing*. No doubt about or rejection of data belonging to the natural world alters in any respect the *general positing which characterizes the natural attitude*. “The” world is always there as an actuality . . . To cognize

“the” world more comprehensively, more reliably, more perfectly in every respect than naïve experiential cognizance can, to solve all the problems of scientific cognition which offer themselves within the realm of the world, that is the aim of the *sciences belonging to the natural attitude*.<sup>128</sup>

All sciences of reality are sciences of the natural attitude because they presuppose the positing of the world. Psychology is no exception. Its objects are lived experiences given in psychological experience, i.e., apperceived as belonging to humans or animals and, therefore, as components of the psychophysical nature. As for the mathematical sciences, they require their attitudes, too (arithmetical, geometrical, etc.), which, as it were, are added to, and do not interfere with, the natural attitude.<sup>129</sup>

The natural attitude is characterized by the positing of the spatiotemporal reality in its entirety, which is always presupposed by all the aforementioned activities. What in the *Logical Investigations* and the other writings analyzed previously is conceived as a metaphysical presupposition of science and of prescientific thinking becomes now a component of the stream of lived experiences as it unfolds in our ordinary life.

What has been explained in the previous section can now be connected to the notion of natural attitude. The positing of the world is the positing of the world as *a fact*; but the world as fact necessarily has an essence, or, as Husserl speaks in the *Grundprobleme der Phänomenologie*, to the world as a fact there corresponds the world as an *idea*, i.e., what necessarily belongs to any world that could possibly exist. In other words, the positing of a fact always implies the positing of a universe of possibilities of which that fact is just a contingent instantiation. In the attitude which is proper to the ontological disciplines (the eidetic attitude), what is carried out is a shift of focus from the fact of the world to its essence, to the invariant structure of any worldly reality whatsoever. But in so doing, in developing the eidetic disciplines that unfold the a priori form of the world, we also make explicit the sense included in the positing of the world, i.e., in the “natural thesis”:

*The “ontology” of nature unfolds in its disciplines the pure formal-general sense of the natural thesis or the givenness of the natural attitude as such, whereas the question as to what justifies a thesis of such sense-content, just as the further particular question as to what justifies the respective particular science of nature in its particular theses, remains outside of its scope.*<sup>130</sup>

The material eidetic disciplines making up the ontology of nature express the formal-general sense of the positing characterizing the natural attitude, but they do not say anything about the rationality of such

positing, nor about the rationality of the scientific activities that further cognize the world of the natural attitude. This is the task, again in a formal and general way, of the theory of knowledge, which, in turn, as we are about to see, is conducted on the terrain of transcendental phenomenology, i.e., a discipline that, being based on the suspension of the belief in the existence of the world, is free from metaphysical presuppositions and, thus, can provide the basis for the ultimate clarification of the being of reality.

## §8. Transcendental Phenomenology and the Theory of Knowledge

The preceding two sections have dealt with one of the fundamental lines of inquiry of the phenomenological theory of science, namely, regional ontology. It is clear how regional ontology brings to completion a thesis that was only prefigured in the 1898–1899 lecture and partly developed in the 1906–1907 course, namely, that the objective side of the grounding of the empirical sciences requires not only an investigation into a formal a priori common to all conceivable objects of knowledge, but also an investigation into the material a priori pertaining to the different regions of reality. It is now time to turn to the articulation of this system of objective a priori truths with the theory of knowledge as it is developed on the grounds of Husserl's transcendental philosophy. Only after clarifying the relation between transcendental phenomenology and the theory of knowledge will it be possible to understand the sense in which the former can ground the metaphysical completion of positive sciences in general and the sciences of nature in particular. In this section, I will closely follow an article written by Husserl in 1917, "Phenomenology and Theory of Knowledge," in which a concise account of this relation is provided (from within the framework of the transcendental approach presented in *Ideas I* a few years earlier). This text has the further advantage of constantly foregrounding nature and the science of nature as the paramount examples illustrating the articulation of the different disciplines grounded in transcendental phenomenology.<sup>131</sup>

Husserl begins his analysis precisely at the point we have presently reached. In the quest for a theory of science (*Wissenschaftstheorie*) able to overcome the limitations of positive sciences, we have encountered two eidetic disciplines: formal ontology (also called *mathesis universalis*) and the group of material or regional ontologies. According to Husserl, the origins of both can be traced back to the work of Plato and his school.<sup>132</sup> In the case of material ontology, Husserl refers to geometry, to the a priori science of space and time. Formal ontology is the formal theory of science, and, as we already know, it can be supplemented by the formal theory of multiplicity and by the a priori theory of empirical

knowledge. The different material ontologies, too, can be called *logic* or *Wissenschaftstheorien*,<sup>133</sup> because they provide a critique of the reason at work in the corresponding empirical disciplines. In short, so far, the theory of science appears articulated in formal and material parts, both of which deal with the objective contents of science. However, the theory of science, and, along with it, the critique of reason, are far from being exhausted by these “object-directed” a priori disciplines. What is necessary is an *authentic and radical critique of reason* where reason is conceived as a structural function of the subject accomplishing any scientific endeavor.<sup>134</sup> We find a preliminary characterization of this type of investigation in the following historical remark:

We meet in antiquity, in Parmenides and, above all, in an effective negative form in the Sophistic, the first seeds of the authentic problematic of the critique of reason, into which, to start with, we have to gain some insight, a problematic that is not directed to truth and being, not to theory and science in the sense of a theoretical system, but to rational consciousness itself. The sophistic skepticism in regards to truth and to being as correlates of truth has its parallel in a skepticism in regards to knowing, that is in regards to the possibility of a knowledge directed to being in the sense of an objectivity that transcends consciousness.<sup>135</sup>

Per Husserl, the problematic of an authentic critique of reason (not of a theory of the a priori components of scientific theory, which is the task of both formal and material ontology) was already prefigured in the ancient world by the contrast between Parmenides's thesis of the identity between thinking and being, i.e., that there is a correlation between rational thought and what is ultimately real, and Gorgias's skepticism. Gorgias's skepticism concerns not only the correlation between truth and being, i.e., not only the possibility for a true judgement to express what is real, but also, and more fundamentally, the very correlation between consciousness and being, i.e., the possibility for consciousness to grasp a transcendent being at all. According to this type of skepticism, no matter what different components can be distinguished within consciousness, no matter the character of evidence that may belong to them, what is found within consciousness remains inherently immanent to the subject and unable to warrant access to a transcendent domain. In this way, we come to the formulation of the problem of transcendent knowledge, the problem that has motivated the development of the theory of knowledge.

No matter how much more precisely these differences may be grasped, they are by all means differences within subjectivity. But how can immanent lived experiences or immanent characters of lived experiences, and let them be called also characters of “rationality” –

in modern terms, “feelings of evidence, of necessity of thought” etc. – legitimately signify something beyond the immanent sphere?<sup>136</sup>

This formulation of the problem of transcendent knowledge aligns with Husserl's aforementioned formulations, as does the further claim that this formulation already presupposes the ground of consciousness as absolutely given and amenable to an immanent description, whereby its *Erlebnisse*, along with their components, can become objects of knowledge.<sup>137</sup> In other words, the very question about the possibility of *transcendent* knowledge (a term that has been intended as extra-subjective, or “*außer-subjektive*,”<sup>138</sup> in a way that transcendent phenomenology denounces as misleading) presupposes the possibility of *immanent* knowledge. What is new here is the radicalism with which Husserl develops the motive of the necessary absence of metaphysical presuppositions in the theory of knowledge, which was already at work before and during the time of the *Logical Investigations*.

This novelty emerges in the distinction between “the anthropological and the radical formulation of the problem of transcendence.”<sup>139</sup> The anthropological or psychologistic formulation consists in asking how a human being (or, equivalently, I as a human being) can obtain knowledge of what is transcendent with respect to consciousness, while the radical formulation consists in asking: “How is it possible that in the knowing consciousness something transcending it becomes knowable?”<sup>140</sup> The radical formulation demands that the problem of transcendent knowledge (or, equivalently, the problem of transcendence) be referred to consciousness as purified by any apperception in virtue of which it is apprehended as a part of nature, as annexed to humans or animals. The anthropological formulation, which is in its own right legitimate and must be scientifically pursued according to its own methods, fails to address the fundamental problem of transcendence, because it presupposes the existence at least part of what is transcendent. A simple way to realize why this approach does not respond to genuinely philosophical concerns is to think about what any other radical skeptics would object to it: “How can I, in the first place, come to know that I am a human being, which in turn implies the existence of my body as well as of the spatiotemporal nature of which my body is a component?”

According to Husserl, this radical formulation was never completely understood before the breakthrough of transcendental phenomenology. From Husserl's exposition, it is clear, though, that the reason for this is not that all previous philosophers have been unable to go beyond the anthropological or naturalistic formulation, but that they have failed to do so in a complete or radical way. This is the case with Descartes, who has indeed questioned the transcendence of nature and of the subject as a human being endowed with a body, but not the transcendence of the “empirical-personal subject,” as of the “*mens sive animus*,” which is the



consciousness of the “empirical Ego.” As Husserl will say in the *Cartesian Meditations*, Husserl has identified the pure Ego of the *cogitationes* with a part of the human being, a part that, in contrast to the body, does not fall under the methodic doubt.<sup>141</sup> Descartes’ subject, therefore, while not a human being, is still a “surviving part” of a human being, and thus a part of the transcendent world. The correct ground of the problem of transcendence was missed also by classical empiricism. Whereas Locke’s theory of knowledge relapsed into a full-blown naturalism,<sup>142</sup> Hume’s fictionalism, which indeed questioned the being of nature in a radical way, was still based on psychological transcendences such as the “fundamental psychological faculties characterized by psychological laws as that of the association of ideas and habit.”<sup>143</sup> Finally, even Kant’s formulation of the problem of knowledge is affected by the limitations resulting from the fact that he “constantly operates with transcendent presuppositions that stem from the natural conception of the world (*‘natürlichen Weltauffassung’*).”<sup>144</sup> Kant’s transcendent presuppositions are to be sure subtler and less evidently related to the dogmatic “naturalistic” standpoint of most formulations of the problem of knowledge, but they are no less harmful.

They are transcendencies that, under the title affecting thing in itself, are derived from the natural thesis of the extrasubjective world, in part from the material external world that is naturally given, in part, under the title transcendental faculties and functional laws, from the natural reality of the subject, as a subject of faculties that manifests itself in the actual behavior of consciousness, of a human person.<sup>145</sup>

As is clear from this quotation, Husserl believes that the very notion of the thing in itself is derived from the natural positing of an extrasubjective, i.e., transcendent, world. Kant, of course, does not equate the thing in itself to what is taken as real by common sense, but his notion of the thing in itself is a philosophical construction which emanates from the things of common sense, resulting from the problem of the correspondence between representation and object. Likewise, Kant’s use of transcendental faculties and functional laws is derived from the natural apprehension of the human subject.

These examples are meant to indicate that the pure formulation of the problem of transcendent knowledge becomes possible only if the natural attitude, i.e., the attitude based on the thesis of the existence of spatiotemporal reality, is made thematic and overcome. The key to understanding the possibility of overcoming the natural attitude is found in reflection. By reflecting on our conscious life, we realize that all objects, from the things of immediate perception to the highest theoretical products of scientific thought, are unities corresponding to a multiplicity of acts of consciousness. By reflecting on our conscious lives, we bring to light these complexes

and interlocked systems of intentional *Erlebnisse* along with their various components that constitute transcendent objects. Conversely, we realize that any object confirms its self-identity in a multiplicity of manifestations that can be placed under a reflective scrutiny. Moreover, we realize that such a multiplicity of manifestations (of ways of appearing) is specific to each determined region of being. By a generalized application of this principle to nature and to the science of nature, and by implicitly referring to the infinity of potential acts of consciousness implicated in the horizons of conscious life, Husserl presents, in broad strokes, the grand plan of the scientific knowledge of nature as an *idea*:

If we rise to the level of the “idea,” we then have this great and evidently complex parallelism of the ideas: on the one hand, nature itself, as the totality of the real being itself, and the ideally completed science of nature; the ideally closed system of true propositions and theories, which combined in the unity of the true and completed theory of nature, make up its theoretical counterpart. On the other hand, we have again as an idea the total system of the possible concordant experiences of nature completely confirming themselves; further, the idea of the total possible scientific or “rational” consciousness with its noetic and noematic components: as correlate of the idea of science as unity of the theory. On this last side, that of consciousness, we have the overflowing infinities, because to each unity of nature (which stands as an open infinity in space, time and in the real-causal nexus) multiple infinities of consciousness according to noesis and noema correspond as “constituting,” and each unity represents, as it were, a focal point, in which infinite beams converge.<sup>146</sup>

This passage contains all the key elements of the idea of the transcendental constitution of nature in consciousness. To nature as a sphere of being there corresponds the ideal unity of complete true scientific theory in which nature finds expression. At this level, we find a parallelism between real being and the theory expressing it. But each component of this double structure finds a corresponding parallel on the side of consciousness. To nature as the totality of being, there corresponds the idea of the infinite system of concordant experiences in which nature constitutes itself at the perceptual level, while to the idea of a complete scientific theory of nature there corresponds the infinite system of theoretical acts at work in scientific knowledge. At both levels, consciousness is articulated in noetic and noematic components, i.e., in intentional acts and their inseparable noematic side, the object intended as intended. As Husserl stresses at the end of this passage, the ideal infinity implicated on the side of consciousness is of a higher order since to each numerical identical transcendent unit there corresponds an infinity of acts of consciousness.

Now, it becomes clear that the authentic notion of *reason* refers to these constituting multiplicities of acts of consciousness. The fundamental theory or critique of reason consists in a systematic investigation of the essence of these multiplicities of acts of consciousness. The main difference between Husserl's critique of reason and Husserl's consequent radical formulation of the problem of knowledge, on the one hand, and the just mentioned classical formulations, on the other, lies in the new form of appeal to reflection on which the former rests. Indeed, since knowledge consists always in an *Erlebnis*,<sup>147</sup> the problem of the possibility of knowledge makes sense only when correctly referred to the relation between *Erlebnisse* and their objects.<sup>148</sup> Reflection, to be sure, is not a novelty in the history of modern philosophy, but the inability of completely overcoming the anthropological or naturalistic formulation of the problem of knowledge was a consequence of the inability to purify the reflective analysis from all transcendencies, whether causal-external or internal (under the guise of psychic faculties and corresponding laws). Furthermore, shortly after writing the *Logical Investigations*, as is well known, Husserl came to realize that even the purely descriptive study of the essence of the acts of knowledge practiced there, even purely descriptive psychology, was unable to secure the authentic ground of the theory of knowledge, even though no explicit claims about transcendent realities were in play. So long as these analyses concerned the essence of psychological *Erlebnisse*, their object was still in principle a part of the world, whose (material) a priori form was in question. Only the transcendental reduction (the suspension of the natural attitude) and, consequently, the transformation of psychological reflection into phenomenological reflection could open up the field of an investigation into the essence of consciousness conceived, not as a part of the world, but as the absolute ground of manifestation of the world including human and animal subjects. Such an advance was made possible, as again is well known, by the realization that the object of reflection includes not only the noetic side of consciousness but also the noematic side, the side of the intended objects as intended. The world becomes included in the field of phenomenology as phenomenon and the transcendental subject appears as the subject that not only *has before it*, so to speak, all transcendencies, but also, in a specific sense, *includes them* as synthetic units of sense. At this point, the analysis of knowledge carried out by psychological reflection acquires the character of a legitimate, but partial and derivative, field of investigation.<sup>149</sup>

Following Husserl's text, it is now possible to give a list of definitions clarifying the relation between transcendental phenomenology and the theory of knowledge. The rational consciousness, conceived as the structured totality of the constituting acts of consciousness, has been in question up to now as doxic, or theoretical, consciousness, the one that is at work in the specifically cognitive accomplishments. Along with doxic

rational consciousness, one must first consider axiological consciousness as constitutive of values and practical consciousness as constitutive of the objects of will. Even these three spheres of rational consciousness (which according to Husserl constitute an inseparable unit<sup>150</sup>) do not coincide with consciousness in general.<sup>151</sup> Consciousness in general includes, to be sure, also “unreason” or irrationality, as well as the sphere of neutral consciousness such as the sphere of phantasy with its correlated quasi-worlds.<sup>152</sup> Accordingly, transcendental phenomenology, or the eidetic science of transcendental consciousness requiring the pure, or transcendental, or phenomenological, apperception,<sup>153</sup> will first investigate the most general structures of consciousness, those that are common to all the aforementioned species of consciousness. For instance, a general account of the essence of any intentional act and of its inseparable components will be housed in the general part of phenomenology. This general part is required for the development of the phenomenology of reason with its three different components.

As for the relation between transcendental phenomenology and the theory of knowledge, Husserl concludes:

The legitimate problems of the theory of knowledge, this is the sense of all these considerations, can be posed only on the terrain of phenomenology. All radical problems of the theory of knowledge are phenomenological, and all other problems, that can further be ranked under this title, among which the problems of the correct “interpretation” of factual nature and of the results of natural sciences, presuppose the pure problems of the theory of knowledge, i.e., the phenomenological – unless they are not absurd problems, in which case, however, the important task is to dissolve these absurdities and to guide absurd thinking to the way of clarity.<sup>154</sup>

This means that the part of the theory of knowledge that concerns the fundamental and general problems of the “correlation between pure, knowing reason and reality”<sup>155</sup> is absorbed by transcendental phenomenology, more specifically, by the phenomenology of reason.<sup>156</sup> The more applied problems that stem from the interpretation of the factual sciences, which, as Husserl says, are also considered as belonging to the theory of knowledge, will be addressed on the basis of the eidetic insights provided by the phenomenology of reason. It is also important to notice that the theory of knowledge of transcendence is only a part of the general theory of knowledge, which will encompass all objects in general, including the immanent ones.<sup>157</sup> Consequently, Husserl extends the use of the term “transcendental” beyond the thematic of the constitution of transcendence to include all authentic problems concerning the possibility of knowledge.<sup>158</sup> Finally, in light of these conclusions, it appears that transcendental phenomenology can be considered a *Wissenschaftstheorie*,

and precisely as that *Wissenschaftstheorie* that consists in a study of the functions of consciousness at work in all scientific accomplishments, including phenomenology itself.<sup>159</sup>

### §9. Transcendental Phenomenology and Metaphysics as the Ultimate Science of Reality

It is now possible to give an account of Husserl's conception of the relation between science and metaphysics in its mature form. The reader might feel a bit puzzled by the long series of different characterizations of the disciplines that jointly provide the ultimate clarification of empirical science. However, the aim of this chapter is to show the underlying continuity of Husserl's intellectual evolution, so that it becomes possible to appreciate how the mature transcendental approach addresses the concerns that guided Husserl from the beginning. The terminological shifts that create such difficulties in attempting to unpack this evolution must count as the progressive putting into focus of an image, or, as Husserl himself says, as the progressive exploration of uncharted territory.<sup>160</sup>

The cardinal distinction in this ordering of disciplines is the one between a priori, eidetic disciplines and "factual," empirical ones. On the side of the a priori disciplines we find the *mathesis universalis* supplemented by the different regional ontologies. As we have seen, the totality of these disciplines already amounts to a theory of science in an objective sense: they detail the conditions of possibility of every empirical inquiry in a purely "formal" way. Such "form" is empty and absolutely general in the case of the *mathesis universalis* and specific in the case of the regional ontologies. While the *mathesis universalis* details what pertains to the empty form of an object whatever, and, correlatively, to the general form of a theory whatever, the different regional ontologies express the formal sense of what is posited by the natural attitude, i.e., they provide the a priori form of the spatiotemporal world the existence of which is uncritically accepted by prescientific as well as scientific activities. This entire universe of objective a priori, however, can be correctly unfolded and elucidated only by means of the phenomenological theory of knowledge, which is yet another a priori, eidetic discipline, but one pertaining to the rational functions of transcendental consciousness. Here we find the ultimate theory of science, the one investigating the a priori structure of knowing subjectivity, and, thus, the correlation between rational consciousness and being. The phenomenological theory of knowledge, consequently, requires the suspension of the natural attitude and also of the aforementioned a priori disciplines, which are not part of it but which it encompasses,<sup>161</sup> insofar as they provide the themes of its different analyses. This methodological move takes up and radicalizes the principle of the absence of metaphysical presuppositions that guided Husserl's theory of knowledge from the beginning. Transcendental phenomenology

thus unfolds a system of “subjective” a priori governing the correlation between reason and being that does not presuppose factual truths about the world. As we have seen in the section devoted to the *Logical Investigations*, the theory of knowledge is unconcerned with problems of factual existence or with the problem of deciding whether the *de facto* existing empirical data warrant belief in the existence of the world and its being so and so structured. As anticipated (see Chapter 2, §2), this important caveat is carried over to transcendental phenomenology. The claim that “this world is” and the different groups of empirical hypotheses put forth by the sciences of the world amount, respectively, to the implicit premise of any scientific inquiry rooted in the natural attitude and to their tentative results. These factual claims obviously do not belong to any a priori discipline. The phenomenological theory of knowledge will only deal with the general form of the legitimate positing, i.e., transcendental constitution, of a possible world the form of which is a priori determined by the objective a priori disciplines and the factual existence of which are left undetermined. Only the *application* of such a theory of knowledge to the concatenations of *Erlebnisse* factually existing in transcendental consciousness provides the elucidation of the a posteriori claims “this world exists” and “it is determined in such and such a way according to the results of our sciences.”

In light of these general indications, we can now turn to some of Husserl's most explicit formulations of the relation between transcendental phenomenology, science, and metaphysics. In a famous letter to Wilhelm Dilthey dating to 5–6 July 1911, Husserl writes:

Every science of existence [*Daseinwissenschaft*], for example, the science of physical nature, or science of the human spirit, etc., turns *eo ipso* into metaphysics (according to my concept), insofar as it is related to the phenomenological doctrine of essences and undergoes, from its origins, a final clarification of sense, and thus a final determination of its truth content. The truth which is thus expounded, for example, the truth in natural science, regardless of how limited and relative it may be from another point of view, is ultimately a component of “metaphysical” truth, and its knowledge is metaphysical knowledge, namely, ultimate knowledge of existence [*Dasein*]. The idea that a metaphysics in this sense is necessary in principle – vis-à-vis the natural and human sciences which have arisen from the great labor of modern times – has its origin in the fact that a stratification is rooted in the essence of knowledge and that, connected with it, there is a two-fold epistemic attitude: on the one hand, the attitude can be purely directed toward being, which is consciously intended and which is thereby thought and given in appearance; but on the other hand, the attitude can be directed to the enigmatic essential relations between being and consciousness.

The entire natural knowledge about existence, all knowledge within the first attitude, leaves open an area of problems on whose solution depends the ultimate definitive determination of the sense of being and the ultimate evaluation of the truth that has already been reached in the “natural” (first) attitude. I believe I can see that there can be no other meaningful problems behind the ultimate ones, namely, the “constitution” of being in consciousness, along with the related problems of being; that, therefore, no other science can lie behind the phenomenological expanded and founded (universal) science of existence (which, in its work, includes *all* the natural sciences of existence); or rather, that it is nonsense to speak of a *fundamentally* unknowable being that still lies beyond this [*dahinter liegenden*]. This excludes every Kantian “metaphysics” of the thing-in-itself, as well as every ontological metaphysics that is extracted from a system of pure concepts that forms a science of existence, *à la* Spinoza.<sup>162</sup>

Many years later, in a footnote to the first volume of *First Philosophy*, Husserl expresses himself in very similar terms:

In the phenomenological interpretation of the positive sciences of facts, there spring up the ultimately scientific sciences of facts, the sciences of facts that are in themselves philosophical and tolerate, besides themselves, no other special philosophies being attached to them. By means of the ultimate interpretation of the objective Being [*Sein*] explored in these sciences as a fact, an interpretation that accrues to these sciences in the application of eidetic phenomenology; and by means of the universal contemplation, also required in this phenomenology, of all the regions of objectivity [*Objektivität*] in relation to the universal community of transcendental subjects; the universe of the world, the universal theme of the positive sciences, acquires a “metaphysical” interpretation, which means nothing other than an interpretation behind which it would make no scientific sense to seek another.<sup>163</sup>

These two long passages contain all the fundamental elements that we have introduced so far, and they attest to the enduring character of Husserl's opinion on the matter. The truth content of the empirical sciences can be clarified only by resorting to a different attitude, directed to the pure knowing subjectivity. This clarification is operated by virtue of the doctrines of essences, i.e., the eidetics of consciousness, and the objective eidetic doctrines that the former encompasses. This theoretical operation overcomes the naïveté of the sciences of the world and turn their truths into components of metaphysical truth, i.e., of the ultimate knowledge of what in fact exists. Furthermore, these passages allow us to comment

on the differences between this mature formulation and the ones we have previously discussed. In the first place, they reflect Husserl's final choice to restrict the term metaphysics to the domain of the factual. As we have seen, in some of his earlier formulations, metaphysics encompassed an a priori and an a posteriori, empirical or factual, part, although the tendency to consider the latter as the real and authentic metaphysics was already noticeable. In particular, in 1905 Husserl had ranked the theory of knowledge as a part of formal metaphysics along with formal logic (see Chapter 2, §5). The formal part of metaphysics, by investigating the sense of being of reality, was meant to replace the general metaphysical convictions that had dominated the metaphysical debates of modernity. Now, once Husserl develops his mature transcendental approach, transcendental idealism seals the fate of all these metaphysical positions. The theory of the constitution of the different regions of being in transcendental consciousness carries out the elucidation of the general ontological form of reality by detailing in what way the sense of being characteristic of each such region is constituted in transcendental consciousness. The other use of the term "a priori metaphysics," too, namely, the a priori science of reality (later to be replaced by the regional ontologies), which we find in the 1905–1906 lectures, is abandoned. Metaphysics thus becomes the part of philosophy that deals with facts, with *Wirklichkeit*, as opposed to the eidetic disciplines *qua* sciences of a priori possibilities.<sup>164</sup>

A second important novelty concerns the relation between the empirical sciences in their metaphysical completion. In his previous formulations, Husserl repeated that metaphysics had the task of reworking the results of empirical sciences in such a way that their contribution to the ultimate knowledge of reality would be clarified. Now, Husserl decidedly proclaims that those sciences, once clarified by transcendental phenomenology and the related eidetic doctrines, *become metaphysics*. To be sure, Husserl never thought that metaphysics was literally another science with a different domain of research, and it is not impossible to imagine that, even before the transcendental turn, Husserl could have formulated this process of the grounding of the sciences in this way. After all, one can think that one *does* metaphysics in Husserl's sense precisely by turning the empirical sciences *into* metaphysics. However, this new emphasis on the fact that the sciences of facts themselves become metaphysics can also be read in conjunction with a third element stressed in both texts. The letter to Dilthey asserts that the elucidation of the being investigated by the sciences of facts that transcendental constitution makes possible is such that there can be no other science "behind" them. This is clarified by means of two examples: there can be no metaphysics of the thing in itself *à la* Kant and no metaphysics *à la* Spinoza "extracted from a system of pure concepts that forms a science of existence."<sup>165</sup> The second text expresses the same concept by



underscoring that there can be no further (or “deeper”) interpretation of the being of reality than the one offered by transcendental phenomenology. Thus, what the theory of constitution rules out is any philosophical doctrine according to which the being investigated by the empirical sciences would only be an aspect or a manifestation of a deeper reality. In other words, no talk of hyperphysical reality is possible, simply because no hyperphysical reality is conceivable. This excludes the unknowable thing in itself *à la* Kant, but also the slightly less unknowable will of Schopenhauer’s metaphysics. Furthermore, a metaphysics such as Spinoza’s, according to which both nature and the mind amount to modes of an infinite substance, is also ruled out, because it implies that beyond nature and mind there lies a deeper reality, an ultimate, self-subsisting substance. In Chapter 5, it will appear that Husserl’s transcendental idealism highlights how all classical metaphysical positions were ultimately based on metaphysical “substructions,” i.e., on objectivistic constructions which are possible only insofar as the sense of being of nature and spirit is not interrogated on the original ground of the life-world. Husserl’s frequent use of the term “metaphysics” in a derogatory sense must be understood in this way.

Given that this is a result of the theory of transcendental constitution, one can surmise that the more resolute formulation according to which phenomenology transforms empirical science into metaphysics was prompted by the awareness that the theory of constitution allows for the elucidation of the sense of being of reality in such a way that the reality they themselves investigate acquires *metaphysical value* because it becomes clear that nothing lies beyond it. It is not easy to see how such a claim could be grounded by Husserl before the transcendental turn, i.e., before regarding all real being as a unit of sense in transcendental consciousness, even though, in his earlier texts, Husserl did assign to metaphysics the task of unveiling the ultimate ontological value of the being investigated by the sciences. In other words, transcendental constitution is what allows Husserl to proclaim without hesitation that the being investigated by the empirical sciences is one that admits no reality “behind it.” We will be in a better position to appreciate how such grounding occurs within transcendental phenomenology at the end of Chapter 4.

In sum, transcendental phenomenology inherits, so to speak, the “metaphysical function” that Husserl assigned to the theory of knowledge at least as early as the 1890s by replacing the metaphysical controversy over the ontological status of the world with the elucidation of the sense of its being.<sup>166</sup> This is something that has often been overlooked by those who have discussed the relation between transcendental idealism and metaphysics.<sup>167</sup> Scholars have focused on the latter problem without paying enough attention to Husserl’s own use of the term metaphysics in relation

to the sciences of reality. Now, the reconstruction of the evolution of Husserl's thought here presented should convey that, while Husserl decidedly moved away from considering the theory of knowledge based on phenomenology itself as metaphysics, and while phenomenology is certainly meant to be free from any metaphysical presuppositions, Husserl never thought that the traditional metaphysical questions concerning the being of the world in relation to subjectivity would form a different area of investigation surviving over and beyond transcendental phenomenology. Transcendental idealism seals the fate of all such metaphysical adventures and replaces them with the methodic analysis of the way in which the being of the different regions of the world is relative to the absolute being of consciousness.<sup>168</sup> The next three chapters will further clarify this matter.

## §10. Summary and Conclusion

This chapter has explored the gradual development of Husserl's notion of metaphysics as the ultimate science of reality from the 1890s to the rise of transcendental phenomenology. The resulting picture is one of gradual and continuous progress. From his early analyses on space, if not earlier, Husserl firmly believed that modern empirical sciences are theoretically unsatisfactory. The representations they produce are affected by a fundamental lack of clarity concerning their ultimate relation to being, for *in what sense* what science says is true is precisely the problem. In other words, the problem is to understand in what way science contributes to a general metaphysical picture of reality.

Interpreters have often glossed over this apparently uninteresting, a posteriori metaphysics, while they have often focused on the relation between phenomenology and the metaphysical positions such as idealism and realism, notably under the heading of the so-called problem of the metaphysical neutrality of phenomenology and of its bearing on the mind-dependence/mind-independence character of the world. What has been missed, in this way, is that these two "senses" of metaphysics are aspects of what Husserl considered from as early as the 1890s to be one and the same theme: the ultimate knowledge of reality. Once the rationality of a fact is fully elucidated, no matter its intrinsic contingency, that fact is a component of real being, of what ultimately exists, i.e., a *metaphysical fact*. But its rationality involves its inscription in a subdomain of the world and, via this inscription, a relation to knowing subjectivity, which modernity has spelled out in terms of various different metaphysical positions. One can highlight the connection between these two senses of metaphysics also by reflecting on what Husserl meant, again, from the beginning, by demanding that the theory of knowledge be free of metaphysical presuppositions.

To be sure, this implies that the theory of knowledge must not rely on any prescientifically or scientifically established matters of fact, such as the existence of sense organs or an account of how physical stimuli act upon them. But it cannot presuppose that the world contains purely material as well as animated things, nor realism or idealism about the external world, nor any distinction between a mental “inside” and a material “outside.”<sup>169</sup> All such claims are to be ranked among the unwanted *metaphysical* presuppositions, for they refer either to specific factual components of reality, or to its partitioning in different subdomains, or its existence and ontological status in relation to the mind. If in the *Logical Investigations* this general framework is hardly discernible, it is because, in that work, the theory of knowledge is in question primarily in relation to the formal-ideal disciplines, while the problem of the elucidation of the empirical sciences remains in the background. However, such elucidation of the formal-ideal disciplines was meant also to contribute to metaphysics in the broad aforementioned sense, so much so that, as we have seen, shortly after the publication of the *Logical Investigations* Husserl briefly called both pure logic and the theory of knowledge *formal metaphysics*. Subsequently, he (briefly) uses that expression in relation to the a priori ontology of reality.

The upshot of this analysis is that empirical sciences, no matter the truth of their results, remain unintelligible from a philosophical point of view, because we lack a *fundamental science* able to elucidate the sense in which we speak of a world and of knowledge of it. This is where transcendental phenomenology enters the picture. By elucidating the sense of being of the entities belonging to all ontological regions, transcendental phenomenology provides the a priori framework underlying all possible factual realities. In virtue of this, the results of the sciences are situated on the ground of the correlation between subjectivity and being and their bearing on reality becomes clarified. It becomes clear in what sense they are sciences of the world, and not just truth-seeking techniques or, worse, activities aiming at practical mastery. Furthermore, the aim of the phenomenological theory of science is to provide the ultimate ontological closure of these sciences, so as to rule out any hidden reality, any *ignorabimus*, as well as any hyperphysical investigation supposedly able to see the being investigated by the sciences as an aspect or appearance of a more fundamental reality. In this sense, elucidated science becomes metaphysics, knowledge of ultimate reality, and, in particular, the sciences of nature become metaphysics of nature.

As we have seen, Husserl's terminology has continually evolved from the very beginning. Indeed, even the use of the term metaphysics for the results of the phenomenological grounding of the science seems to gradually disappear. Already in 1911, Husserl claims that his use of

metaphysics may not be fitting and that, perhaps, the word “philosophy” would be better for his purposes.<sup>170</sup> It is not easy to explain why he thought that this would be the case. One can surmise that Husserl sensed how dangerously misleading it could be for his contemporaries to hear that the aim of the phenomenological theory of science was to turn the *positive* sciences into *metaphysics*, given how discredited metaphysics was at the time, particularly within scientific circles. We can find an indication that this might have been the case in §9k of the *Krisis*, where Husserl mentions that every attempt to understand in what sense science is knowledge of the world is rejected as “metaphysical” by the scientists, accustomed as they are to practice their disciplines as mere techniques,<sup>171</sup> where, of course, metaphysics is intended as ungrounded speculation about the world. One can also imagine that Husserl, as he did so many times, especially after the transcendental turn, was trying to avoid as much as possible classical terminological jargon in order to discourage philosophical misunderstandings concerning his writings. What is certain is that Husserl increasingly reserves the term “metaphysics” for the further, even more fundamental, philosophical investigation regarding the so-called highest and ultimate questions concerning God, birth, death, and the sense of life,<sup>172</sup> which are, in their own right, problems that concerns factual reality and not simply eidetic possibilities, and presuppose the preliminary clarification of being of the world described by the empirical sciences. Nevertheless, this gradual terminological shift does not alter at all the philosophical significance of his conception of the philosophical completion of the sciences. In 1911, Husserl uses the beautiful expression “philosophization” (“*Philosophierung*”) to refer to such activity.<sup>173</sup> This will remain the core idea up until the years of the *Krisis*. The sciences, once phenomenologically elucidated, become *metaphysics*, as he says up to the 1920s, or *second philosophy* (as opposed to phenomenology, the first philosophy),<sup>174</sup> or *genuine sciences*,<sup>175</sup> as he will say years later. The point is always that they become branches of a universal philosophy grounded in phenomenology, where philosophy means nothing other than the universal science of being.

In conclusion, let us stress that this chapter is largely programmatic and extremely general in character. It remains to be elucidated how, in practice, transcendental phenomenology achieves the just mentioned aims. With the exception of Mach's phenomenalism, it likewise remains to explain where exactly Husserl stands with respect to the philosophers and positions reconstructed in Chapter 1, although one can already presume that they will share the fate of the classical, modern metaphysical views, of which they obviously constitute a late development. The next two chapters, by focusing on the more specific analyses contained in *Ideas I* and *Ideas II*, and by reading them in light of the general framework developed in this chapter, will provide further insights into this matter.

## Notes

1. For a number of excerpts from Husserl's letters and lecture courses that clearly convey Husserl's self-understanding as a renovator of the metaphysical tradition, see Hua XLII, *Einleitung*, pp. LXI–LXV.
2. Hua XLII, p. 160.
3. A detailed study of the authors and texts forming the background for Husserl's notion of metaphysics is still missing. It is clear, however, that in Stumpf's works we read a number of formulations of the task and nature of metaphysics that, to say the least, resonate with Husserl's conception. See, for instance, Stumpf 1907, pp. 42–44, where he outlines the tasks of a metaphysics that works in connection with the empirical sciences, and Stumpf 1924, p. 254, where we find the idea of a metaphysics in part built “from below” (“*von unten*”) on the results of the sciences and in part dealing with the relation between the physical and the mental and, beyond that, with the “ultimate questions [*letzten Fragen*] concerning God and immortality.” On this issue, see also Ghigi 2007, pp. 21–26.
4. Parts of §8 of this chapter is reprinted in the entry “Phenomenology and Theory of Knowledge” of the *Routledge Handbook of Phenomenology and Phenomenological Philosophy*.
5. For a more detailed account of the evolution of Husserl's early concept of metaphysics, see Trizio 2017.
6. In this respect, a confrontation with Helmholtz's conception of space would be particularly interesting.
7. *Fragen eines Philosophie des Raumes*, Hua XXI, pp. 262–266.
8. Hua XXI, p. 263.
9. At this stage, the notion of a genetic question still refers to a subject apprehended as a real component of the world, whence the reference to the double origin in the individual or in the species.
10. Hua XXI, p. 263.
11. Hua XXI, p. 265. My emphasis.
12. Hua XXI, p. 266.
13. *Beziehung der logischen und metaphysischen Frage*, Hua XXI, pp. 268–269.
14. Hua XXI, p. 268.
15. Hua XXI, p. 268.
16. Hua XXI, pp. 268–269.
17. Hua XXI, p. 269.
18. Hua XXI, p. 269.
19. *Mehrfache Bedeutungen des Terminus Raum*, Hua XXI, pp. 270–274.
20. Hua XXI, p. 270.
21. Hua XXI, pp. 270–271.
22. Hua Mat III, p. 225.
23. Hua XVIII [A-Text and B-Text], p. 23; 2001, p. 14.
24. See, for instance, Stumpf 1908, pp. 4–6.
25. Hua Mat III, p. 229.
26. This harsh judgement will be partly modified in the *Krisis*, where Husserl, while still regarding German idealism as unscientific (*Krisis*, p. 201), speaks admiringly about Hegel (*Krisis*, p. 192) and “the great systems of German idealism,” which “all share the basic conviction that the objective sciences (no matter how much they, and particularly the exact sciences, may consider themselves, in virtue of their obvious theoretical and practical accomplishments, to be in possession of the only true method and to be treasure houses of ultimate truths) are not seriously sciences at all, not cognitions ultimately grounded, i.e., not ultimately theoretically responsible for themselves – and

- that they are not, then, cognitions of what exists in ultimate truth" (*Krisis*, p. 99). This is no minor concession, for it implies the recognition that German idealism was addressing the crisis of philosophy and science that was crippling European civilization since Hume's time.
27. Hua Mat III, p. 229. The famous motto mentioned by Husserl, "*Zurück zu Kant!*" ("Back to Kant!") was introduced by Otto Liebmann, one of the thinkers who, along with Helmholtz, Lange, and Trendelenburg, contributed to the birth of neo-Kantianism.
  28. Hua Mat III, pp. 229–230.
  29. This is a phenomenon that, according to Husserl, was taking place during his own time, thus confirming Beneke's "prophetic" words (Hua Mat III, pp. 231–232).
  30. Hua Mat III, p. 228.
  31. Hua Mat III, pp. 233–234.
  32. Hua Mat III, p. 251.
  33. Hua Mat III, p. 241.
  34. Hua Mat III, p. 234.
  35. Hua Mat III, p. 241.
  36. Hua Mat III, p. 241.
  37. Hua Mat III, p. 238.
  38. Hua Mat III, pp. 238–239.
  39. Hua Mat III, p. 239. My emphasis.
  40. Hua Mat III, p. 238.
  41. Mach 1914, p. 363.
  42. Hua Mat III, p. 239.
  43. Hua Mat III, p. 240.
  44. Hua Mat III, p. 241.
  45. Hua Mat III, p. 230. An author that at that time stressed the dependence of metaphysics on the theory of knowledge was Eduard von Hartmann. An insightful reconstruction of the relation between von Hartmann and Husserl is in Gérard 2019. If it is true that Husserl read von Hartmann's *Kritische Grundlegung des Transcendentalen Realismus* before the publication of the *Logical Investigations*, then the 1898–1899 lecture may well have been influenced by that work.
  46. Hua Mat III, pp. 241–242.
  47. Hua Mat III, p. 241.
  48. Hua Mat III, p. 245.
  49. Hua Mat III, p. 243.
  50. Hua Mat III, p. 243.
  51. Hua Mat III, p. 243.
  52. Hua Mat III, p. 243.
  53. Hua Mat III, pp. 243–244.
  54. Hua Mat III, p. 244. The belief in the absolute constancy of physical laws is a bit overly optimistic, though, since laws can also be, and have been, amended as science progresses. Nevertheless, the point here is that the underlying representations may well change while the laws remain the same.
  55. Hua Mat III, p. 244.
  56. Hua Mat III, p. 245.
  57. Hua Mat III, p. 244.
  58. See also Hua XXII, pp. 168–169, where, once more, the seemingly antirealist stance only introduces the idea of a metaphysical completion of empirical sciences.
  59. Hua Mat III, p. 246.
  60. Hua Mat III, pp. 246–247.
  61. Hua Mat III, p. 247.

62. Hua Mat III, pp. 251–252.
63. Hua XVIII, p. 27, A-Text and B-Text; 2001, p. 16.
64. Hua XVIII, pp. 230–231, A-Text and B-Text; 2001, pp. 144–145.
65. Hua XIX/1, §7.
66. Hua XVIII, p. 27, A-Text and B-Text; 2001, p. 16.
67. Hua Mat I, p. 5.
68. Hua XVIII, p. 252, B-Text, with minor modifications with respect to A-Text; 2001, pp. 157–158.
69. Hua XVIII, p. 256, A-Text and B-Text; 2001, p. 160.
70. “All theory in the empirical sciences is merely putative theory. It explains by means of basic laws which are not for our insight certain, but which are only for this insight probable.” Hua XVIII, p. 257, A-Text and B-Text; 2001, p. 160.
71. Hua XVIII, p. 257, A-Text and B-Text; 2001, pp. 160–161. In the change made in the second edition, Husserl makes it explicit that he is referring to the fact that the secondary qualities appearing in the objects must be treated as simple “phenomena.”
72. Hua XVIII, pp. 257–158, A-Text and B-Text; 2001, p. 161.
73. Hua XVIII, pp. 257–158, A-Text and B-Text; 2001, p. 161.
74. “In the field of our previous experience the previous theory was the ‘only right’ one, in the field of extended knowledge the theory that we now must try to establish is the ‘only right’ one.” Hua XVIII, p. 158, A-Text and B-Text; 2001, p. 161.
75. Hua XVIII, p. 257, B-Text; 2001, pp. 160–161. The only difference with respect to the A-Text is the explicit (and not merely implicit) reference to secondary qualities.
76. Hua XIX/1, p. 26, A-Text.
77. In this respect, my reading differs from the one proposed by Zahavi in a number of publications (e.g., Zahavi 2001, 2002, 2010, 2017). See also Zahavi and Boucher (2008), where it is claimed that, for the Husserl of the *Logical Investigations*, metaphysics is “independent from phenomenology” and “without relations to it” (p. 505). Zahavi has recently reasserted this thesis while characterizing the metaphysical significance of Husserl’s transcendental turn: “Whereas Husserl in *Logische Untersuchungen* considered metaphysics to be something that is independent of and unrelated to phenomenology, he now explicitly argues that it presupposes and requires a transcendental phenomenological clarification” (Zahavi 2017, pp. 49–50). See Trizio (2018) for an extended analysis of this problem.
78. As Zahavi acknowledges (Zahavi 2017, p. 37).
79. Obviously, the same scientific fact acquires a very different interpretation if it is elucidated *à la* Mach or, instead, according to a form of realism.
80. The one metaphysical position that Husserl does not seem to express any reservation about in these years is realism. This, however, does not mean that he was committed to it as is often taken for granted.
81. Hua Mat II, pp. 11–13.
82. Hua Mat III, pp. 9–10.
83. Hua Mat V, pp. 29–30.
84. Hua Mat V, p. 41.
85. In the lecture delivered in Göttingen in 1909 (*Einführung in die Phänomenologie der Erkenntnis*), Husserl is explicit on the issue: “The theory of knowledge as science refers to knowledge in general. It is not itself metaphysics, but the foundation of all metaphysics” (Hua Mat VII, p. 37).

86. See especially §35.
87. See especially §51.
88. "In a certain way, every empirical science is a science of what is real. It deals with real things, with their real becoming, with their real relations, etc. Each such science is, therefore, in its way, an ontology" (Hua XXIV, p. 93; 1984, p. 96).
89. Hua XXIV, p. 96; 1984, p. 94.
90. Hua XXIV, p. 97; 1984, p. 95.
91. Hua III/1, p. 120.
92. Hua XXIV, pp. 97–98; 1984, p. 95 (translation slightly amended).
93. As we know, the different epistemological and metaphysical outlooks did influence the research programs of the predominant schools of physicists and chemists. The most striking example is provided by the disagreement about whether thermodynamics had to be reduced to atomistic mechanics, as Boltzmann thought, or formulated in a purely "phenomenal way," as Mach and Duhem struggled to do. However, this disagreement did not concern the experimental laws themselves, which Husserl considered the real achievement of scientific research.
94. "Above and beyond the merely relative sciences of Being, there must be a definitive science of Being that alone *has* to satisfy our highest, ultimate interests in Being, that has to investigate what has to be considered as Real in the ultimate, definitive sense. This radical science of Being, the science of Being in the absolute sense, is *metaphysics*" (Hua XXIV, p. 99; 1984, p. 96). A few lines later, Husserl adds: "Metaphysics is, therefore, again ontology, *radical ontology*, the science of *ὄντως ὄν*, instead of one of Being in the empirical sense, which we supposedly know so well and which, upon closer inspection, at times turns out to be illusory and deception, and at times, an unclear intimation of a Being receding ever farther away the farther we search and never to be definitively grasped" (Hua XXIV, p. 99; 1984, p. 97).
95. Hua XXIV, p. 99; 1984, p. 96. See also Hua XXIV, p. 100; 1984, p. 98: "Metaphysics is to investigate what is *realiter* in the ultimate and absolute sense. It claims to *provide the interpretation, the ultimate interpretation, of the empirical sciences of reality*. It is, we said, essentially related to the content of these sciences. Through it, it acquires its relationship to the actually present reality, to reality as it is *de facto*."
96. Hua XXIV, p. 99; 1984, p. 97.
97. Hua XXIV, p. 99; 1984, p. 97.
98. Hua XXIV, pp. 100–101; 1984, p. 98.
99. Hua XXIV, p. 102; 1984, p. 99.
100. Indeed, if "material metaphysics" were synonymous with what Husserl will later term "material ontology" then the remaining part of this passage would be unintelligible.
101. And, soon enough, the term "material metaphysics" will be dropped entirely.
102. Hua XXIV, p. 102; 1984, p. 99. Husserl develops important considerations about the relation between formal logic and a priori ontology of the real (which he also calls "real logic") in §§23 and 24 of these lectures.
103. Hua XXX, *Einleitung des Herausgebers*, p. xxviii.
104. Hua XXVIII, pp. 281–284.
105. Hua XXX, p. 366.
106. Hua XXX, p. 368.
107. Hua XXX, p. 369.



## 92 Husserl's Conception of Natural Science

108. Kant 1998, p. 263. See also Kant 2004, p. 3.
109. Note that what is in question here is the ontology of physical (or material) nature only. In the lecture course *Grundprobleme der Phänomenologie* (Winter Semester 1910–1911), Husserl speaks of the ontology of nature as comprising the ontology of the physical nature and the ontology of the psychical nature (Hua XIII, p. 131). This amounts to a significant, but in general unharmful, terminological oscillation. Note, further, that the ontology of psychical nature does not comprise idealized disciplines. To the entire ontology of nature in this broad sense, Husserl opposes the ontology of spirit, which provides foundations for the cultural disciplines.
110. Hua XXX, p. 370.
111. Hua XIII, p. 129.
112. Husserl refers to the disputed a priori character of these principles belonging to Kant's pure science of nature, but immediately reaffirms their eidetic nature (Hua XIII, p. 130). Other examples are mentioned in Hua Mat IV, pp. 166–168. Needless to say, Husserl speaks in a way that suits classical mechanics better than anything else.
113. Kern 1964, p. 146. On Husserl's appropriation of Kant's idea of a pure science of nature see Kern 1964, pp. 145–150; Pradelle 2019, pp. 9–13. Finally, it is important to stress that Kant calls "metaphysics of nature" the a priori science of nature, whereas Husserl calls it the "ontology of nature." Once more, for Husserl, metaphysics in the genuine sense is a posteriori.
114. With respect to Aristotle, Husserl remarks that the categories of (physical) nature are the original Aristotelian ones, with the difference that, for Aristotle, they could be applied to "*Geist*," too (Hua XXX, p. 370, see also Hua Mat IX, pp. 88–104).
115. Hua XXX, p. 372.
116. Hua XXX, p. 372–374. In this text, Husserl considers formal ontology as pertaining to the analytic region of "*Etwas überall*." In *Ideas I*, instead, Husserl will call it "empty" or "quasi-region" because of its lack of material content.
117. Hua XXX, p. 373.
118. *Ideas I*, p. 5.
119. *Ideas I*, p. 18.
120. *Ideas I*, p. 15.
121. *Ideas I*, p. 15.
122. *Ideas I*, p. 15.
123. "According to what we were saying, any empirical science belonging to the extension of a region will be essentially related not only to the formal, but also to the regional ontological disciplines. We can also express this as follows: *Any science of matters of facts* (any experiential science) *has essential theoretical foundations in eidetic ontologies*" (*Ideas I*, p. 18).
124. Hua XXX, p. 373
125. *Ideas III*, p. 118.
126. *Ideas II*, p. 221. For a detailed account of the notion of attitude, see Staiti 2009.
127. However, it will appear (see Chapter 5, §12) that the natural attitude does not simply branch off into the naturalistic and the personalistic attitudes.
128. *Ideas I*, p. 57.
129. *Ideas I*, §28.
130. Hua XIII, p. 135. A very similar formulation can be found in *Ideas II* (§49): "As we know, it pertains to the essence of this nature – which consequently emerges here as the pure sense of the acts that make up the natural attitude,

as their constitutive correlate – that a thorough grounding is accomplished as the positing of nature in the first sense, that of physical nature, in which everything else that is called nature has the source of its sense, as something founded therein” (Hua 175, English, p. 184). One can also appreciate in what sense material ontology develops the discipline that Husserl had earlier called “formal metaphysics” (*qua* a priori ontology of the real).

131. As Husserl himself avers. See Hua XXV, p. 147.
132. Hua XXV, pp. 126, 132.
133. Hua XXV, p. 133.
134. As Husserl will say in the *Cartesian Meditations*, reason is not “*an accidental de facto ability*, not a title for possible accidental matters of fact, but rather a title for an *all-embracing essentially necessary structural form belonging to all transcendental subjectivity*”(Hua I, p. 92; 1960, p. 57).
135. Hua XXV, p. 135.
136. Hua XXV, p. 136.
137. Hua XXV, p. 136.
138. Hua XXV, p. 136.
139. Hua XXV, p. 137.
140. Hua XXV, p. 137.
141. Hua I, §10.
142. Hua XXV, p. 139.
143. Hua XXV, p. 140.
144. Hua XXV, p. 140.
145. Hua XXV, p. 141.
146. Hua XXV, pp. 146–147.
147. “In all of its manifestations, knowledge is a mental experience: knowledge belongs to a knowing subject. The known objects stand over against it” (Hua II, p. 20; 1999, p. 17).
148. “All meaningful problems of the theory of knowledge in general and in particular all problems of the possibility of a transcendent knowledge, which reaches beyond the proper essence and being of consciousness, have their source in reflection” (Hua XXV, p. 150).
149. Hua XXV, §§16–20.
150. Hua XXV, p. 197.
151. Hua XXV, p. 147.
152. Hua XXV, p. 148.
153. Terms that Husserl considers synonyms (Hua XXV, p. 160).
154. Hua XXV, p. 189.
155. Hua XXV, p. 190.
156. Husserl stresses the unity of phenomenological investigation in the fact that even the phenomenology of reason cannot be treated in isolation with respect to the phenomenology of unreason. See Hua XXV, pp. 197–198.
157. Hua XXV, p. 191.
158. Hua XXV, p. 191.
159. Hua XXV, p. 205.
160. Hua V, pp. 151–152; *Ideas II*, p. 419.
161. Hua Dok III/6, p. 205.
162. Hua Dok III/6, p. 50; 1981, pp. 206–207, translation slightly modified.
163. Hua VII, p. 188. Quoted in Bernet, Kern and Marbach 1993, p. 232.
164. We find the same partitioning of philosophy into an a priori part and an a posteriori part called “metaphysics” in the surviving parts of the *Vorlesung über die Grundprobleme der Ethik und Wertlehre* of 1911 (Hua XXVIII, especially pp. 176–180).

165. For Husserl's views on Spinoza's metaphysics, see Hua Mat IX, pp. 424–435.
166. Indeed, “transcendental” for Husserl means, first and foremost, “concerning the consciousness-relative sense of being of the transcendent” (Hua IX, p. 289), and, by extension, what concerns the self-constitution of transcendental subjectivity itself.
167. In Carr (1999), for instance, we find an attempt to completely disentangle transcendental phenomenology from questions concerning the ontological status of the world. For a more detailed discussion of this problem, see Trizio 2018.
168. “As long as one knows only of psychological subjectivity, posits it as absolute, and yet would explain the world as the mere correlate of this subjectivity, then idealism will be countersensical, will be psychological idealism – the one opposed by an equally countersensical realism” (Hua V, p. 154; *Ideas II*, p. 421).
169. In general, it cannot presuppose any distinction between “I” and “not-I” (Hua Mat III, p. 197).
170. Hua XXVIII, p. 230.
171. *Krisis*, p. 57.
172. See, for instance, Hua VII, p. 188, Hua I, p. 182, *Krisis*, p. 9.
173. Hua XXVIII, p. 182.
174. Hua IX, p. 298; 1981, p. 33.
175. See, for instance, Hua XVII, p. 4; 1969, p. 4; *Krisis*, p. 3.

## Bibliography

- Bernet, R., Kern, I. and Marbach, E. (1993). *An Introduction to Husserlian Phenomenology*. Evanston, IL: Northwestern University Press.
- Carr, D. (1999). *The Paradox of Subjectivity: The Self in the Transcendental Tradition*. Oxford: Oxford University Press.
- Ghigi, N. (2007). *La metafisica in Edmund Husserl*. Milano: Franco Angeli.
- Hua I. Husserl, E. (1950). *Cartesianische Meditationen und Pariser Vorträge*. The Hague: Martinus Nijhoff; *Cartesian Meditations: An Introduction to Phenomenology*. D. Cairns (Trans.). The Hague: Martinus Nijhoff, 1960.
- Hua II. Husserl, E. (1950). *Die Idee der Phänomenologie*. The Hague: Martinus Nijhoff; *The Idea of Phenomenology*. L. Hardee (Trans.). Dordrecht: Springer, 1999.
- Hua III/1. Husserl, E. (1976). *Ideen zu einer reinen Phänomenologie und phänomenologischen Philosophie, Erstes Buch: Allgemeine Einführung in die reine Phänomenologie*. The Hague: Martinus Nijhoff; *Ideas Pertaining to a Pure Phenomenology and to a Phenomenological Philosophy, First Book*. F. Kersten (Trans.). The Hague: Martinus Nijhoff, 1983.
- Hua IV. Husserl, E. (1952). *Ideen zu einer reinen Phänomenologie und phänomenologischen Philosophie, Zweites Buch: Phänomenologische Untersuchungen zur Konstitution*. The Hague: Martinus Nijhoff; *Ideas Pertaining to a Pure Phenomenology and to a Phenomenological Philosophy, Second Book*. R. Rojcewicz and A. Schuwer (Trans.). Dordrecht: Kluwer, 1989.
- Hua V. Husserl, E. (1952). *Ideen zu einer reinen Phänomenologie und phänomenologischen Philosophie, Drittes Buch: Die Phänomenologie und die Fundamente der Wissenschaften*. The Hague: Martinus Nijhoff; *Phenomenology and the Foundations of the Sciences*. T. Klein and W. Pohl (Trans.). The Hague: Martinus Nijhoff, 1980.

- Hua VI. Husserl, E. (1954). *Die Krisis der europäischen Wissenschaften und die transzendente Phänomenologie: Eine Einleitung in die phänomenologische Philosophie*. The Hague: Martinus Nijhoff; *The Crisis of European Sciences and Transcendental Phenomenology*. D. Carr (Trans.). Evanston, IL: Northwestern University Press, 1970.
- Hua VII. Husserl, E. (1956). *Erste Philosophie (1923/24). Erster Teil: Kritische Ideengeschichte*. The Hague: Martinus Nijhoff.
- Hua IX. Husserl, E. (1968). *Phänomenologische Psychologie*. The Hague: Martinus Nijhoff.
- Hua XIII. Husserl, E. (1973). *Zur Phänomenologie der Intersubjektivität. Texte aus dem Nachlass: Erster Teil (1905–1920)*. The Hague: Martinus Nijhoff.
- Hua XVII. Husserl, E. (1974). *Formale und transzendente Logik. Versuch einer Kritik der logischen Vernunft*. The Hague: Martinus Nijhoff; *Formal and Transcendental Logic*. D. Cairns (Trans.). The Hague: Martinus Nijhoff, 1969.
- Hua XVIII. Husserl, E. (1975). *Logische Untersuchungen. Erster Band. Prolegomena zur reinen Logik*. The Hague: Martinus Nijhoff; *Logical Investigations*. Vol. I. J. N. Findlay (Trans.). London and New York: Routledge, 2001.
- Hua XIX/1. Husserl, E. (1984). *Logische Untersuchungen. Zweiter Band. Erster Teil. Untersuchungen zur Phänomenologie und Theorie der Erkenntnis*. The Hague: Martinus Nijhoff.
- Hua XXI. Husserl, E. (1983). *Studien zur Arithmetik und Geometrie (1886–1901)*. The Hague: Martinus Nijhoff.
- Hua XXII. Husserl, E. (1979). *Aufsätze und Rezensionen (1890–1910)*. The Hague: Martinus Nijhoff.
- Hua XXIV. Husserl, E. (1984). *Einleitung in die Logik und Erkenntnistheorie. Vorlesungen 1906/07*. The Hague: Martinus Nijhoff.
- Hua XXV. Husserl, E. (1987). *Aufsätze und Vorträge (1911–1921)*. Dordrecht: Martinus Nijhoff.
- Hua XXVIII. Husserl, E. (1988). *Vorlesungen über Ethik und Wertlehre 1908–1914*. Dordrecht: Kluwer Academic Publishers.
- Hua XXX. Husserl, E. (1996). *Logik und Allgemeine Wissenschaftstheorie. Vorlesungen 1917/18 mit ergänzenden Texten aus der ersten Fassung von 1910/11*. Dordrecht: Kluwer Academic Publishers.
- Hua Mat I. Husserl, E. (2001). *Logik Vorlesung 1896*. Dordrecht: Kluwer Academic Publishers.
- Hua Mat II. Husserl, E. (2001). *Logik Vorlesung 1902–3*. Dordrecht: Kluwer Academic Publishers.
- Hua Mat III. Husserl, E. (2001). *Allgemeine Erkenntnistheorie. Vorlesung 1902/03*. Dordrecht: Kluwer Academic Publishers.
- Hua Mat IV. Husserl, E. (2002). *Natur und Geist. Vorlesungen Sommersemester 1919*. Dordrecht: Kluwer Academic Publishers.
- Hua Mat V. Husserl, E. (2002). *Urteilstheorie Vorlesung 1905*. Dordrecht: Kluwer Academic Publishers.
- Hua Mat VII. Husserl, E. (2005). *Einführung in die Phänomenologie der Erkenntnis*. Dordrecht: Springer.
- Hua Dok III/6. Husserl, E. (1994). *Briefwechsel*. Vol. VI: *Philosophenbriefe*. Dordrecht: Kluwer.
- Husserl, E. (1981). *Shorter Works*. Notre Dame: University of Notre Dame Press.
- Kant, I. (1998). *Critique of Pure Reason*. Cambridge: Cambridge University Press.

- Kant, I. (2004). *Metaphysical Foundations of Natural Science*. Cambridge: Cambridge University Press.
- Kern, I. (1964). *Husserl und Kant*. The Hague: Martinus Nijhoff.
- Mach, E. (1914). *The Analysis of Sensations*. Chicago and London: The Open Court Publishing Co.
- Pradelle, D. (2019). Principes de la philosophie husserlienne des sciences: réflexivité, historicité, fondation. In: J. Farges and D. Pradelle, eds., *Husserl Phénoménologie et fondements des sciences*. Paris: Hermann, pp. 9–42.
- Staiti, A. (2009). Systematische Überlegungen zu Husserls Einstellungslehre. *Husserl Studies*, 25(3), pp. 219–233.
- Stumpf, C. (1907). *Zur Einteilung der Wissenschaften*. Berlin: Verlag der Königl. Akademie der Wissenschaften.
- Stumpf, C. (1908). *Die Wiedergeburt der Philosophie*. Leipzig: Verlag von Johann Ambrosius Barth.
- Stumpf, C. (1924). Selbstdarstellung. In: R. Schmidt, ed., *Die Philosophie der Gegenwart in Selbstdarstellungen*. Leipzig: Meiner, pp. 204–265.
- Trizio, E. (2017). Husserl's early concept of metaphysics as the ultimate science of reality. *Phainomenon*, 26, pp. 37–68.
- Trizio, E. (2018). Il significato metafisico della teoria fenomenologica della conoscenza. *Bollettino Filosofico*, 33(1), pp. 160–174.
- Zahavi, D. (2001). À propos de la neutralité métaphysique des Recherches logiques. *Revue Philosophique de Louvain*, 99(4), pp. 715–736.
- Zahavi, D. (2002). Transcendental subjectivity and metaphysics. *Husserl Studies*, 25, pp. 103–116.
- Zahavi, D. (2010). Husserl and the 'absolute'. In: C. Ierna, H. Jacobs and F. Mattens, eds., *Philosophy, Phenomenology, Sciences*. Dordrecht: Springer, pp. 71–92.
- Zahavi, D. (2017). *Husserl's Legacy*. Oxford: Oxford University Press.
- Zahavi, D. and Boucher, D. (2008). Phénoménologie et Métaphysique. *Les Etudes philosophiques*, 4, pp. 499–517.

# 3 Transcendental Consciousness and Nature

## §1. The Centrality of the Thing of Perception in the Delimitation of the Region of Pure Consciousness

As is well known, *Ideas I* was intended to be the first of a three-volume treatise on phenomenology and phenomenological philosophy, which, eventually, Husserl left unfinished. The aim of the first volume was to provide a general introduction to transcendental phenomenology as “the science fundamental to philosophy,”<sup>1</sup> i.e., as the philosophical discipline providing the basis for all remaining parts of philosophy as well as of all positive sciences. The object of the planned second volume was the more specific relation between phenomenology and the positive sciences: the natural, the social, and the mathematical sciences. This was to be achieved through constitutive analyses of all material and formal regions. The analyses actually developed by Husserl have been published in what was then called *Ideas II* and *Ideas III*. The third volume, which was never written, was meant to focus on the idea of philosophy in general, showing how phenomenology could provide the basis for “every metaphysics and other philosophies ‘that will be able to make its appearance as a science.’”<sup>2</sup> The three volumes, as is clear, would have provided a unitary picture of the dreamed-of universal phenomenological philosophy, rooted in transcendental phenomenology, embracing all philosophical disciplines and special sciences and culminating in metaphysics.

So much suffices to remind ourselves of Husserl’s aim in *Ideas I*, which is not to cast light on the constitution of some specific types of objectivities but to introduce the reader to the new fundamental science, transcendental phenomenology, and to avoid the misunderstandings that are likely to arise thereabout. This task requires a clarification of the object and method of the new science, whose object is transcendental or pure consciousness, or, equivalently, the field of transcendently purified phenomena. More specifically, transcendental phenomenology is introduced as a new eidetic science, the science unfolding the eidetics of transcendental consciousness. This fact explains the internal articulation of *Ideas I*. Transcendental phenomenology differs from empirical psychology, first,

because it is an eidetic science and not a science of matters of fact, and, second, because it concerns pure consciousness and not the psyche.<sup>3</sup> Consequently, Part One of *Ideas I* is devoted to eidetic cognition and the related concepts of eidetic intuition and eidetic science (a treatment that, while lacking the crucial notion of eidetic variation, establishes a terminology that Husserl will never abandon), while Part Two, the famous “Consideration Fundamental to Phenomenology,” deploys a complex strategy aimed at disclosing the region of pure consciousness as the field of the new eidetic science. Subsequently, Part Three explores the most general eidetic structures of pure consciousness, such as the noema-noematic correlation, and, finally, Part Four shows how a phenomenology of reason, which concerns reason in all its forms – doxastic, practical, and axiological – coincides with phenomenology taken universally.<sup>4</sup> Phenomenology thus appears as the organon of all cognition, praxis, and evaluation, and, accordingly, as the first among the philosophical sciences. Its relation to the positive sciences can be investigated, in the first place, by studying the constitution of the different regions of being in transcendental consciousness, a task that, as just said, is partly accomplished in what we now know as *Ideas II* and *Ideas III*.

For a closer look at this project, let us focus on Part Two, the “Consideration Fundamental to Phenomenology.” As has been noted, while translating its title, it is important not to pluralize the original singular, for this section has one and only one goal, which Husserl indicates as “*the acquisition of a new region of being never before delimited in its own peculiarity – a region which, like any other genuine region, is a region of individual being.*”<sup>5</sup> Or, similarly, as “*the acquisition of the essence of that ‘pure’ consciousness which will determine the field of phenomenology.*”<sup>6</sup> This formulation of the goal already signals the peculiar difficulties pertaining to the new science. It appears that the domain of this science, the region of pure consciousness, is extremely hard to bring to light; it consists of a *world*, as Husserl says, the existence of which we find it difficult to acknowledge due to the orientation of intentional life most natural to us.

Now, bringing to light the region of pure consciousness is tantamount to showing the possibility of a new attitude in which that region becomes thematic, an attitude in which the positing of the spatiotemporal world is suspended.<sup>7</sup> In the “Consideration Fundamental to Phenomenology,” this possibility is shown via an eidetic analysis of consciousness carried out within the natural attitude. In this context, eidetic psychology is pursued in order to pave the way to transcendental phenomenology. The following formulation of the aim of this section of *Ideas I* encompasses all the notions just introduced and clearly expresses their mutual interconnection:

What we absolutely need is a certain universal insight into the essence of *any consciousness whatever* and also, quite particularly, of consciousness in so far as it is, in itself, by its essence consciousness of

“natural” actuality. In these studies we shall go as far as is necessary to effect the insight at which we are aiming, namely the insight *that consciousness has, in itself, a being of its own which in its own absolute essence is not touched by the phenomenological exclusion*. It therefore remains as the “*phenomenological residuum*,” as a region of being which is of essential necessity quite unique and which can indeed become the field of a science of a novel kind: phenomenology.<sup>8</sup>

“Not [to be] touched by the phenomenological exclusion” means to remain at our disposal as an open field of possible explicit position-taking after the positing of the whole spatiotemporal reality, including consciousness apperceived as belonging to human beings and animals, is suspended (and once the world “as eidos” and all eidetics referring to it are likewise excluded as possible objects of the new science<sup>9</sup>). In other words, consciousness must appear as something whose being does not presuppose the existence of the world, and is, in this sense, *absolute*. Moreover, these eidetic considerations must show that a correct understanding of the intentionality of consciousness reveals that consciousness is not only a being radically distinct and autonomous from the being of the world, but also a being that “carries” in itself the world as a pure phenomenon. The world, which has undergone a complete reversal of apprehension, is now only that which manifests itself in the closed domain of consciousness; the latter, in turn, does not admit of any “outside,” in the spatiotemporal or any other sense.

The theme of the “Consideration Fundamental to Phenomenology” importantly connects to the entire conceptual development presented in Chapter 2. Its conclusion was that it is impossible to transform the positive sciences into ultimate sciences of reality without a clarification of the sense of their fundamental assumptions, and first and foremost without a clarification of the sense of the most important among them, the positing of the world. While the sciences themselves are unable to effect an investigation of this kind because they are bound to remain within the natural attitude, past philosophical attempts to ground them in the theory of knowledge, as we have seen, have always been unable to completely free themselves from transcendencies that ultimately stem from such an attitude (see Chapter 2, §8). As a consequence, the sense of being of the world has always been missed and a variety of erroneous interpretations of the being of the world have arisen. Now, given that only a correct account of the essence of knowledge can pave the way to such clarification, and given that knowledge is, at bottom, consciousness, this theoretical effort can be successful only if the proper essence of consciousness is understood. Yet, consciousness intended as the ground on which the sense of being of the world can be elucidated can only be pure or transcendental consciousness, consciousness free from any worldly objectivation. Such are the stakes of the attempt to open up the sphere of transcendental consciousness and to edify the corresponding science.



However, and this explains both the complexity of the “Consideration Fundamental to Phenomenology” and its specific interest in the context of this study, the very misunderstandings concerning the relation between consciousness and the world as well as their respective being that transcendental phenomenology sets out to eradicate are also the ones that make it extremely difficult to gain access to the domain of this new science. Some “natural” misunderstandings about this relation nail us to the natural attitude and need, therefore, to be removed for phenomenological philosophy to be possible. Accordingly, once enough clarity is gained concerning the new region of being correlated to phenomenology (at the end of the “Consideration Fundamental to Phenomenology”), a large part of the critical clarification concerning the sense of being of the world will be already accomplished. Thus, in this text, the being of transcendental consciousness and the being of worldly transcendence are clarified, so to speak, in parallel and by degrees, *by focusing on the implication of the latter in the former*.

After presenting the first, very general results of the eidetics of consciousness, carried out within the natural attitude (§§34–38), Husserl stresses, in §39, the double intertwinement of consciousness and the world as it appears in such an attitude. On the one hand, the *Erlebnisse* exist in the world only in the psychophysical unity of a human or animal, and, on the other, consciousness is in most cases directed towards the surrounding world.<sup>10</sup> Thus, there is at the same time a real inclusion of consciousness in natural reality and an intentional implication of the world in consciousness, or, at least, in certain types of *Erlebnisse*. This intentional implication is what needs to be analyzed and what provides the means to understand the sense of the real inclusion of consciousness in the world.

In order to conduct an analysis of this implication, Husserl takes three preliminary steps. First, he narrows down his analysis to how *material nature* is given to consciousness. This choice is motivated by the founding role of the latter for the entire world: the psychical life of humans and animals is founded upon the material stratum of reality.<sup>11</sup> Second, within consciousness, the analysis must focus on the act that is the source of the natural attitude, namely, *sensuous experience*.<sup>12</sup> It is on the basis of sensuous experience that material nature as well as the psychophysical complexes founded in it can appear. Third, while material nature comprises not only things, but also qualities of things, relations, transformations, and processes, all these components involve direct or indirect reference to thingly being.<sup>13</sup> Thus, by virtue of these three steps, the preliminary eidetic analysis of consciousness focuses on the essence of *thing-perception*: the general theme “consciousness/world” is played out in terms of the narrower title “perceiving consciousness/perceived thing”:

Our natural wakeful Ego-life is a continuous actional or non-actional perceiving. Incessantly the world of physical things and, in it, our body, are perceptually there. How does, and how can, *consciousness*

*itself* become separated out as a *concrete being in itself*? And how does that which is intended to in it, the *perceived being*, become separated out as “*over against*” consciousness and as “*in itself and by itself*”?<sup>14</sup>

These crucial questions guide Husserl’s analysis; they indicate the importance of the problem of the *origin of transcendence* for (and within) consciousness. This is the key to the radical formulation of all problems pertaining to the theory of knowledge. The acquired awareness of the centrality of the thing of perception in this whole problematic explains the centrality in the *Ideas* of the constitution of thingly being and of the relation between the thing of perception and the thing of physics.

## §2. Husserl’s Critique of Naïve Realism and of the Traditional Formulation of the Primary/Secondary Quality Distinction

In light of the preceding, we understand that formulating the correct answer to this question necessitates critiquing the erroneous conceptions of consciousness and reality which stem from what Husserl calls the anthropological formulation of the problem of knowledge (see Chapter 2, §8). As we shall see in the next section, in the “Consideration Fundamental to Phenomenology,” the main target of Husserl’s criticism does not consist, as is often the case, in the classical positions of modernity (which, from Descartes to Kant, are, to be sure, always mentioned) but in one of their contemporary heirs, namely, critical realism. The first sign of this is that Husserl, while introducing the problem of the articulation between perception and material nature, begins by opposing the conception of the naïve human being to the scientific conception. Indeed, this was how critical realists introduced their own epistemological position.<sup>15</sup>

In Husserl’s account of this opposition, the naïve human being is the one who fails to acknowledge the very existence of perceptual consciousness. Let us imagine that the perception of a thing is never troubled by hallucinations or illusions, and that it unfolds without conflicts. In such a case, for the naïve human being:

The perceived physical thing *is actual* and, more particularly, actually itself given in perception “in person.” The perceiving, when I consider it purely as a consciousness and disregard my body and bodily organs, appears like something which is, in itself, inessential: an empty looking at the Object itself on the part of an empty “Ego” which comes into a remarkable contact with the Object.<sup>16</sup>

The key to understanding this passage is the term “inessential.” What does it mean that, for the naïve human being, perception is devoid of essence? A being without essence is not a being at all; it is nothing, a sheer

ontological void without any intrinsic properties. Of course, this naïve human being knows that the eyes are necessary for vision, that without them there is no possibility of seeing anything at all; but in spite of this, abstracting from this relation with the body, this “seeing” does not appear to him as a being that can be grasped “as a consciousness.” The object “consciousness” remains totally hidden at this level. The naïve human being, therefore, ignores the second moment of the tripartite articulation of intentionality (*Ego cogito cogitatum*), namely, the *cogitatio*. The *Erlebnis* does not come into play; it is just an empty gaze which makes the thing as it is in itself appear.<sup>17</sup> Perceptual intentionality is thus reduced to the encounter between a thing and an Ego, and, without the mediation of the immanence of the *Erlebnis*, it becomes a simple bi-polar Ego-object structure. At bottom, this means that the naïve human being Husserl mentions here is the one who has not yet rendered thematic in the appropriate way the sphere of reflection, who has not yet understood that one can intend not only the thing perceived but also the perception of the thing, and that the latter is, in its own way, an object endowed with a specific essential content distinct from that of the perceived thing. Such forgetfulness of consciousness is responsible for the impression that the Ego “comes into a remarkable contact with the Object.” The point of view of the naïve human being is, therefore, the most extreme naïve realism one could possibly conceive, one which ignores any interrogation concerning the possibility of knowledge. Indeed, if the *Erlebnis* is ignored, there is no distinction between the appearing thing and its appearance, and, consequently, no possible doubt concerning the veracity of the latter with respect to the former. Aside from cases of hallucination, the perceived thing is by definition real and endowed with the properties appearing in it. A simple *reflection* on the perspectival character of perception would suffice by itself to refute this point of view, for it would bring forth the multiplicity of the acts of perception underlying the appearance of an identical thing and, thus, the possibility of modifications that do not pertain to what appears, but to its appearance. Even while mentioning this pretheoretical stance, Husserl highlights that an erroneous conception of knowledge leads to a similarly erroneous interpretation of the being of the world.

After dismissing the point of view of the naïve human being, Husserl discusses that of the scientific human being, which, in modern time, has been determined by the distinction between primary and secondary qualities introduced, in different forms, by authors such as Galileo, Descartes, and Locke.

If I, as a “naïve human being” who is “deceived by the senses” have yielded to my inclinations to develop such reflections, I now recall, as a “scientific” human being the well-known distinction between *secondary* and *primary* qualities according to which the specific

qualities pertaining to the sense are “merely subjective”, and only the qualities dealt with in geometry and physics are “Objective.”<sup>18</sup>

Let us remind ourselves that the reason Husserl mentions here this time-honored distinction is that according to modern scientists’ common sense reasoning, as well as for critical realists, it provides the answer to the question formulated in the previous section concerning the possibility of “separating out” perception and reality. At a very general level, scientifically educated people tend to believe that only primary properties belong to material nature, while the specifically sensible properties exist, so to speak, only in us. Now, while the naïve point of view about perception was hopelessly wrong, Husserl accepts the value of the traditional distinction between primary and secondary qualities, but warns us against possible misunderstandings. One should not be misled into thinking that, after ideally subtracting the secondary qualities from a perceivable thing, we are left with an object existing in itself, purely determined by the primary qualities that are known to us and, perhaps, by some other hypothetical primary properties. The true object, as it is in itself, cannot be rejoined by an abstraction carried out on its sensible appearance. Husserl here refers to Locke, who believed that if, for instance, our eyes were powerful enough, we would not perceive colors, but minute particles endowed with primary qualities only.<sup>19</sup> This interpretation of the distinction between primary and secondary properties falls prey, according to Husserl, to Berkeley’s objection that “extension, the essential core of corporeality and of all primary qualities, is inconceivable without secondary qualities.”<sup>20</sup> Husserl, therefore, after agreeing with Berkeley that extension is the foundation for all material qualities, underlines that, as it is perceived, it can’t be imagined without qualitative filling. For Husserl, and in this he parts company with Berkeley’s immaterialism, the correct interpretation implies an even sharper separation between the direct correlates of perception and the “objective world”:

Rather the entire essential content [*der ganze Wesensgehalt*] of the perceived physical thing, thus the whole physical thing staying there “in person” and all its qualities, including all those which could ever be perceived, is a “mere appearance” [*“bloße Erscheinung”*] and that the “true physical thing is the one determined by physics” [*das “wahre Ding” ist das der physikalischen Wissenschaft*].<sup>21</sup>

Whence it follows that the *true* primary properties are never given in perception, or else, equivalently, that the thing of physics is completely transcendent with respect to the content of perception.

The development of theoretical physics transforms all properties perceived in a thing in such a way that, once this process is completed, the

thing of physics no longer possesses any property in common with the thing of sensible intuition. Extension plays here the chief role. The sensible space must be eliminated to give way to the space of geometry, which becomes the kernel of new determinations. Primary properties are not perceived as they are in the thing, for the very space in which the thing of physics is situated is not the space of perception.

Therefore “*true being*” would be *something determined completely and, of essential necessity, differently from the actuality given “in person” in perception*, given exclusively with sensuous determinations, to which spatial determinations pertaining to the sense also belong.<sup>22</sup>

If we accept these presuppositions, what is the relation between the thing of sensible intuition and its mathematized and “objectively true” counterpart?

*The experienced physical thing proper provides the mere “This,” an empty X, which becomes the bearer of mathematical determinations and corresponding mathematical formulae, and which exists, not in perceived space, but in an “Objective space” of which perceived space is merely a “sign” – a three-dimensional Euclidean multiplicity which is representable only symbolically.*<sup>23</sup>

Husserl determines here this relation with respect to the different forms of givenness of “the two things.” On the one hand, there is a thing, and thus an extension that is properly experienced, and, on the other hand, there is an object (along with its extension) that can be represented only in a *purely symbolic way*. The fact that the physical properties ascribed to a thing are not amenable to direct representation, i.e., in an intuitive act, is a consequence of the non-intuitive character of the space of geometry: *everything that fills a portion of ideal space is itself inaccessible to a direct intuition.*

What is vital to stress is that, according to Husserl, the space of perception is, in some sense, a “sign” of physical space, which is (at least in classical mechanics) a three-dimensional Euclidean manifold. The word employed here is “sign,” not “image” or “likeness,” and it is followed by the expression “purely symbolic representation.” The advocates of the classical interpretation of the distinction between primary and secondary qualities (such as Locke and Descartes) were, instead, inclined to consider the ideas corresponding to the extension and to the form of the external objects as images. This crucial difference finds its explanation in Husserl’s claim that the space of geometry, being an idealization, cannot be the object either of perception or of imagination. No matter how accustomed

we are to working with drawings made on sand, paper, or blackboards, and no matter how convinced we are that we are confronted with imperfect figural representations of the corresponding geometrical objects, we actually operate only with objects whose spatiality is purely phenomenal and allows us to access the objects of geometry in a purely symbolic way. Such objects are neither in the space of the blackboard, nor in the space of ordinary vision, nor even in that of the imagination, which cannot but reproduce the essential traits of the experienced space. A triangle, intended as a geometrical figure, is neither blue nor yellow, neither smooth nor rough, neither large nor small, neither near nor far; nor is it perceived from a certain perspective, nor is it determined within a certain degree of approximation. In short, it is nothing that could be the object of imagination or perception. There is no intuitive act that could bring to givenness this ideal triangle, and whose object would be an image or an analogon of the imperfect “triangles” of perception and imagination. If this is the case, then it is easier to understand Husserl’s careful use of the word “sign.” Indeed, how could one speak about the relation of likeness (which exists precisely between an image and the thing that it represents) between an object of intuition and something that is accessible only to a purely symbolic consciousness? Could there be a relation of likeness between sensuous or imaginative content and a non-intuitive structure such as a three-dimensional Euclidean manifold?

The non-intuitive character of geometrical space offers a sufficient reason for there being a kind of logical derivation of the thing of physics from the thing of sensuous intuition. The latter, in principle, cannot be completely eliminated, for, in logical language, it offers the empty X that is the substrate of the judgements formulated by physicists in their theoretical language. This is an eidetic necessity: one cannot imagine side stepping the sphere of perception and reaching directly for a completely mathematized nature. The thing of physics is necessarily given through the thing of perception. Indeed, even though Husserl formulates a more sophisticated interpretation of the distinction between primary and secondary properties, an interpretation that radicalizes the transcendence of the thing of physics with respect to perception, he immediately adds:

The sensuous contents of the perceptually given itself are always held to be other than the true physical thing existing in itself; nevertheless, the *substrate*, the bearer (the empty X) of the perceived determinations, is always held to be that which is determined by the exact method as having predicates assigned to it in physics. Conversely, then, *any cognition in physics serves as an index [dient demnach jede physikalische Erkenntnis als Index] to the course of possible experiences with the things pertaining to the sense and their occurrences found in those experiences.* It serves, therefore to orient us in the

world of actional experience in which we all live and act. [*Sie dient also zur Orientierung in der Welt der aktuellen Erfahrung, in der wir alle leben und handeln*].<sup>24</sup>

In the first part of this passage, Husserl insists on the identity between the substrate of sensuous determinations and the substrate of the physical predicates: the transcendence of the thing of physics does not imply its absolute otherness with respect to the thing of sensuous intuition, and the latter cannot be considered an “empty simulacrum.”<sup>25</sup> To a certain perceived thing there corresponds a certain “true” description formulated in the language of theoretical physics. In the second part, Husserl derives from this substrate identity a consequence about what physical knowledge implies in turn for the world of sensuous experience. He evokes here in terms familiar to us the function of “orientation” that physical knowledge has in that world (see Chapter 2, §3).

In §40 of *Ideas I* there is no attempt to downplay the epistemic value of physical theory. As we have seen, Husserl characterizes the thing of physics as “true” and “objective” several times. However, the sense of such “truth” and “objectivity” is not yet elucidated at this point. This elucidation is carried out, to an extent, only in §52, where Husserl shows the relativity of the thing of physics to transcendental consciousness and dismisses the “interpretative” errors of critical realism. For the moment, the only established result is that the traditional distinction between primary and secondary qualities must give way to the opposition between the thing of perception and the idealized thing of physics, which is transcendent with respect to the former.

### §3. The Target of Husserl’s Critique: The Wrong Sense of Transcendence Underlying Critical Realism

In this section as well as the following three sections, I will analyze in detail §52 of *Ideas I*, which contains Husserl’s solution to the problem of the relation between the thing of perception and the thing of modern mathematical physics, thus supplementing the results of §40. Once more, we have to keep in mind that §52 also has a role in the overall strategy of the “Consideration Fundamental to Phenomenology.”

Before turning to a detailed analysis of §52, it is necessary to recall the most important results of the eidetic analysis of consciousness that follows §40 concerning the relation between perception and the thing perceived. It is also important to stress that this analysis leaves temporarily aside the so-called thing of physics. In §§41–42, Husserl provides the first purely phenomenological characterization of the difference between being as lived experience and thingly being based on their mode of givenness: the former can be intuited in immanent perception, the latter only by a series of adumbrations. For the naïve pre-phenomenological opposition between the “internal mental life” and the “external world,” one can

now substitute the phenomenological opposition between immanence and transcendence. A further fundamental result, established in §43, consists in the refutation of the belief – widespread not only in classical modern philosophy but, as we have seen, also among critical realists – that in perceptual awareness the thing perceived is grasped through an image or a sign. According to Husserl, the absurdity of this thesis becomes manifest if we reflect on the difference existing between, on the one hand, perceptual consciousness, and, on the other, picture-consciousness or sign-consciousness.<sup>26</sup> In the latter, a sign or a picture is directly given to us in intuition, but, based on this first intentionality, there appears a second intentionality, which is directed to the signified or pictured object. In virtue of this complex structure, such acts are directed to objects that are actually absent, objects only pictured or signified and which, in principle, could be brought to direct givenness in perception. This is not at all the case in normal perception, in which things are directly given to us, without the mediation of any sign or image. The fact that a thing, unlike an *Erlebnis*, is given only one-sidedly does not alter this state of affairs.

In §§44–46, Husserl opposes the phenomenal and dubitable being of what is transcendent to the absolute and indubitable being of what is immanent. This fact has important consequences for the very being of the objects of perception. This is why, in §43, Husserl adds that the existence of a thing that is not actually perceived *means* that, through a concatenation of experiences, it can be brought to direct givenness by myself, or by others with whom I can enter into a relation of empathy:

That the unperceived physical thing “is there” means rather that, from my actually present perceptions, with the actually appearing background field, *possible* and moreover, continuously-harmoniously *motivated* perception-sequences, with ever new fields of physical things (as unheeded background), lead to those concatenations of perceptions in which the physical thing in question would make its appearance and become seized upon. Fundamentally, nothing essential is altered if, instead of a single Ego, a plurality of Egos is taken into consideration. Only by virtue of the relationship of possible mutual understanding can my experienced world become identified with that of others and, at the same time, enriched by their more extensive experience. Thus, a transcendence which lacked the above-described connection by harmoniously motivational concatenations with my current sphere of actually present perceptions would be a completely groundless assumption; a transcendence which lacked such a concatenation *essentially* would be *nonsensical*.<sup>27</sup>

This passage provides the basis for the central tenet of transcendental idealism, i.e., that the world is a unit of sense constituted in transcendental intersubjectivity and nothing beyond that. The interplay of actual and potential consciousness stemming from the structure



of horizon is what allows the elucidation of the world as given in perception. These last results lead us to the chapter entitled “The Region of Pure Consciousness” (of which §52 is a part), which opens up with the famous thought experiment of the annihilation of the world (§47), the purpose of which is to highlight that all possible worlds (and surrounding worlds) are nothing but correlates of possible concatenations of experiencing consciousnesses.<sup>28</sup> After showing the material countersense implied in the idea of a world outside of our world (§48), and after claiming that the being of consciousness would not be affected by the annihilation of the world (§49), Husserl, in §50 (supplemented by §51), achieves the aim of the “Consideration Fundamental to Phenomenology”:

It now becomes clear that, in contrast to the natural theoretical attitude, the correlate of which is the world, a new attitude must in fact be possible which, in spite of the “exclusion” of this psychophysical universe of Nature, leaves us something: the whole field of absolute consciousness.<sup>29</sup>

In regards to this field which “carries” within itself all the correlates of the natural attitude, Husserl stresses, “strictly speaking, we have not lost anything but rather have gained the whole of absolute being which, rightly understood, contains within itself, ‘constitutes’ within itself, all worldly transcendencies.”<sup>30</sup> The fundamental aim of the “Consideration Fundamental to Phenomenology” appears to have been achieved. But a last challenge still awaits to be met. As we know, the previous discussion has been carried out without taking into account reality as described by physics. Might one still maintain, despite the results just outlined, that what physics tries to understand is a reality that lies beyond the world of perception? The conclusions of §40 did not decisively settle the matter, for they did not positively characterize the relation between the thing of perception and the thing of physics. To show that the eidetic results now achieved provide the resources necessary to answer this question is the aim of §52, the title of which is “Supplementations. The Physical Thing as Determined by Physics and the ‘Unknown Cause of Appearances.’” This paragraph elucidates the being of the thing of physics, thereby showing the absurdity of the thesis evoked in the title, namely, that the thing of physics is a theoretical construct the aim of which is to reach, in a very mediate way, for the hidden reality that lies beyond perception and causally determines it.

Husserl begins by recalling that scientists regard the thing of perception as a “mere appearance” of the thing of physics, and, in some way, as “merely subjective.” This vague characterization, Husserl adds immediately, must be qualified in light of the eidetic analyses just conducted. More precisely, Husserl evokes the fundamental distinction between

*Erlebnis* and transcendent object and the refutation of the picture theory/sign theory of perception. The first result prescribes that the subjectivity of the perceived thing cannot be confounded with the subjectivity of an *Erlebnis*. This is an important trait distinguishing Husserl's phenomenology from the predominant modern view of the distinction between primary and secondary properties: what immediately appears is not subjective in the way a component of subjectivity is; it is not "in" the subject, as opposed to the thing of physics that would lie "outside" it. For this reason, while discussing the primary/secondary properties distinction, Husserl speaks of perceived *things* rather than of mental contents or ideas. The second qualification consists in stressing the already demonstrated absurdity of any theory according to which perception works after the model of pictorial or signitive consciousness. This second preliminary qualification must not be overlooked because the subsequent discussion must not be read as just another refutation of the image theory and the sign theory of perception.

Are we then allowed to say, in accordance with the "realism" which is very widely accepted: The actually perceived (and, in the primary sense, appearing) should, for its part, be regarded as an appearance of, or an instinctive basis [*instinktive Substruktion*] for, inferring<sup>31</sup> something else, intrinsically foreign to it and separated from it? May we say that, theoretically considered, this something else should be accepted as a reality [*Realität*], completely unknown by acquaintance [*völlig unbekannte*],<sup>32</sup> which must be assumed hypothetically [*hypothetisch anzunehmende*] in order to explain the course of mental appearance-processes [*Erscheinungserlebnisse*], <accepted> as a hidden *cause* of the appearances characterizable only indirectly and analogically by mathematical concepts?<sup>33</sup>

The position described in this passage corresponds to the views of Helmholtz and of the critical realists (see Chapter 1, §4), which Husserl considers "widely accepted" at the time.<sup>34</sup> Let us recall that Helmholtz had claimed that the external object is not directly given to us and that it is inferred as the (Husserl adds) "hidden" cause of the perceptions of which we are directly aware. This point of view is not immediately discredited by simply denouncing the absurdity of the sign and picture theory of perception, and this is why Husserl sets out to eradicate it completely.

The key idea is that *what is perceived* (and the formulation remains deliberately vague by omitting the term "thing") is characterized as *other* with respect to what constitutes reality proper. Furthermore, reality is characterized as something foreign ("*Fremd*") to what is perceived. The latter is an appearance or manifestation of reality in the rather weak

sense of being an effect of something external and inaccessible. Following Husserl's interesting expression, it is but an instinctive "*Substruktion eines Anders.*"<sup>35</sup>

Transcendence, thus, is gained in a (possibly implicit) causal-inferential manner. But, of course, it is one thing to posit an entity and quite another to give a complete and faithful determination of it. According to this form of realism, the mathematical concepts of theoretical physics can characterize this hidden cause of appearances "indirectly" or "analogically" but they cannot yield a faithful description of it. Let us recall that a way out of this epistemic predicament consisted in claiming that a certain correspondence with external reality is accessible at the nomological level (see Chapter 1, §4).

#### §4. Husserl's Solution to the "Two Things Problem"

After outlining the critical realist standpoint, Husserl presents a sketchy version of a criticism that he believes "could be easily" developed. This criticism is intended to establish two claims: that the idea of a hidden cause of perception is countersensical, and that the inference that supposedly would justify its postulation rests on a confusion between two different types of explanatory hypotheses customary in empirical science. The first claim is, in turn, the consequence of two points, which, again, Husserl believes would be very easy to establish. First, that "if the supposed unknown cause existed at all, it would have to be essentially perceivable and experienceable if not by us then by other Egos who see better and further";<sup>36</sup> second, that "the possible perception itself (added footnote in Copy D: of those cause-realities) would, as a matter of essential necessity, have to be another case of perception by means of appearances and that, consequently, we should fall into an inevitable infinite regress."<sup>37</sup> The second claim is formulated in the following manner:

An explanation of perceptually given processes by hypothetically assumed causative realities, by unknown physical affairs (for example, the explanation of certain planetary disturbances by the assumption of an as-yet-unknown planet, Neptune) is something essentially different from an explanation in the sense of a determining of experienced physical things in the manner peculiar to physics – an explanation by such physical-scientific means as atoms, ions, and the like.<sup>38</sup>

As we shall see (see Chapter 3, §7), the first of these two points has often been misunderstood as revealing an alleged contiguity between transcendental phenomenology and the (as we would call them today) scientific-antirealist trends of so much epistemology of the time. Let us begin with the second claim, and let us keep in mind that this preliminary, sketchy criticism is entirely based on the preceding eidetic results concerning

a thing's sense of being, "which functions as the absolute norm for all rational discourse"<sup>39</sup> about any natural thing whatever, i.e., about any natural transcendency that is not completely nonsensical.

The discovery of Neptune, which, like other planets, has been postulated as the cause of gravitational discrepancies between calculated and actually observed trajectories of other celestial bodies, is particularly telling as an example of inductive inference taking place from something perceivable to something as yet unperceived. Subsequently, as is well known, Neptune was actually observed by means of a telescope. Here, Husserl might seem to be saying that those causal inferences are legitimate, while the "essentially different" inference from, say, the lines of an emission spectrum of a sample of iron to the orbital structure of its atoms is not. In other words, given that Neptune is, after all, a "*Ding der sinnlichen imaginatio*," and is therefore, at least in principle, perceivable, either by using a telescope or by traveling through space, it would make sense to postulate its existence on the basis of a causal inference. Conversely, electrons and their orbits, being in principle unperceivable, cannot even count as candidates for a legitimate causal inference. Thus, Husserl would be a realist towards posits that are in principle perceivable and antirealist towards posits that are in principle unperceivable, as the so-called theoretical entities of contemporary physics are often taken to be. According to this erroneous reading, it would be illegitimate according to Husserl to believe in the existence of the electrons and photons responsible for the emission lines of a sample of iron, just as it is illegitimate to believe in the existence of a hidden cause of our own perception. Such would be Husserl's alleged scientific antirealism.

One should take notice, however, of the fact that Husserl does not say that explanations of observable (or, more often, measurable) effects by means of atoms or ions are illegitimate, but simply "essentially different" from those that take place between potentially perceivable objects. Moreover, he does not equate this inference to those purportedly leading to alleged hidden causes of perception. The inferences used to postulate atoms and ions are not only perfectly legitimate, but also demanded by reason, as Husserl says in §40, and, as we are about to see, they concern the theoretical determinations of the thing and processes we actually perceive. The reason why Husserl mentions this kind of inference is to introduce the right understanding of the thing of physics, which is not in the least an "analogical or indirect" representation of an unknown cause.

Now, as anticipated, a correct reading of Husserl's first claim is possible only by keeping in mind that Husserl is referring to the essence of the correlation between acts of perception and perceived things. The previous eidetic analysis has shown that the sense of the claim "the thing exists" prescribes that there is an in-principle way, following the motivations of our current perception, to experience it. In addition, the world is the

correlate of an intersubjective community of egos who all share the same spatiotemporal reality and can supplement and extend one another's perceptual capacities. Based on acts of empathy, it is possible to accept that other living beings see things that are not, *de facto*, perceivable to me. Those things, let us stress, would not be atoms nor ions, which cannot be the correlates of any perception, whether human or non-human, as §40 has already shown, but good old "things of sensuous *imaginatio*." For instance, ants may well be able to see things that are invisible to us, just as dogs can smell things undetectable by a human nose. Now, if we accept this correlation, if we accept calling "things of perception" only those synthetic units of sense that are constituted in systems of perception, then, if my perception is produced by things that I cannot perceive, that are hidden to me, then these things must be perceivable by others "who see better and further than me." However, by essence, if perception takes place through the intermediary of appearances, those other egos able to directly perceive what is hidden to me would have to postulate a hidden cause of what they directly perceive. A regress to infinity would thus follow. In short, the regress shows that the following two theses – first, that there exists a phenomenological correlation between a thing's being and a system of possible acts of perception, and, second, that our perceptions are causally explained by hidden realities – cannot both be valid. And, given that the first thesis has already been established, the second thesis must be false.

Let us stress that it is completely wrong to understand the first thesis as implying that atoms and ions cannot exist because they cannot be directly experienced. Indeed, the first thesis does not say anything at all about such theoretical posits;<sup>40</sup> it concerns only things as synthetic units constituted in perception: no *such thing* can be hidden in principle. Might we not instead say that the causes of perception are atoms and ions (and the photons they emit)? As we shall see, in some sense, we can, but only if we understand correctly the relation between the constitution of transcendence and causal inferences. It will appear that atoms and ions are not introduced to causally explain our perceptions, and that, most of all, they are not theoretical constructs symbolically representing realities hidden or unknown to us.

In order to understand this point, however, we need to introduce Husserl's own account of the relation between the perceived thing and the thing of physical theory, which is formulated in the following short but famous sentence: "the *perceived physical* thing itself is always and necessarily *precisely the thing which the physicist explores and scientifically determines following the method of physics*."<sup>41</sup> Let us recall that, according to Husserl's reformulation of the classic primary/secondary property distinction, the perceived thing offers only a "mere This" or an "empty X," a merely subjective appearance. Husserl believes that there is no contradiction between the already established result and this identity.

The question that, therefore, comes at once to our mind is: "How can two things having completely different properties nevertheless be the very same thing?" Note that the properties of theoretical physics do not simply add up to the perceivable ones, but must replace them completely. The thing of perception is colored, while that of physics has a given molecular structure, which in turn determines a certain way of reflecting light waves; the thing of perception is warm or cold, while the molecules making up the thing of physics are vibrating with a certain kinetic energy, etc. As we said before, the whole essential content of the thing laying before our eyes is left behind when switching to the idealized world of physics. Crucially, even the space and time of ordinary perception must be replaced by their idealized counterparts. How can we make sense of the identity between two things that do not share a single property, given that we cannot understand even the identity of two things sharing all properties but one?

We first have to bear in mind that there is a certain danger in talking about the identity between "two things." This expression suggests by itself the existence of two distinct realities laying side by side and makes any claim about their identity very problematic. However, the situation here is different because there is no way "to literally point" at the thing of physics, no way to individuate it by detaching it from a background of other realities. On its own, it has no "this-ness." Only perception can pick out a specific part of the sum total of perceptual givenness, only perception can offer the very "thing-ness" of a thing. The "thing-ness" of the thing is then handed over to theoretical thinking. Physics investigates precisely *that* thing that is given in perception and nothing else. In other words, there is no "thing of physics" but in a figure of speech, for there is only the thing of perception, and the thing of perception *as* characterized by physics. This is because perception is an originally presentive act, while theoretical thinking is not: theoretical thinking can only emptily intend an object, while perception can fulfill, of course in a more or less mediate or immediate way, the meaning intentions directed at it.

Now we can understand in what sense there is no contradiction between this identity claim and the results of §40. Husserl must show that the thing of physics, while having completely different determinations, is not something else with respect to what is directly perceived. In order to do so, he goes back once more to the picture and sign theories of perception. This time, however, he claims that the real relation between the two things is much more intimate than the relation between an image or a sign and the corresponding object.

The physical thing as determined by physics, however, is nothing foreign to what appears sensuously in "person"; rather it is something which makes itself known *originaliter* in it, and, more particularly, a priori (for indefeasible eidetic reasons) only in it.<sup>42</sup>

So far, it has appeared that something can be a sign or an image only by being a kind of medium through which the imaged or signaled object is intended. In contrast, the object of perception has appeared as lacking this kind of intentional transparency, for it does not point to anything else. In this passage, however, something new is added: the thing of perception is said to exert a function precluded to signs and images, namely, to announce in itself the very identity of the thing of physics or, as we have just said, its “this-ness.” Thus, the thing of perception is endowed with a very special kind of transparency by virtue of which it allows the manifestation of its theoretical double.

Based on this conclusion, there arises at once a question of how a perceived object can allow the manifestation of something so different from it. To ground this assertion, Husserl resorts to something like a plane description of experimental activities, which anticipates in a very sketchy way the constitutive analyses developed in *Ideas II*. The very object that the experimenters has before their eyes, hold in their hands, put into an oven or a test-tube, and submit to all other experimental procedures, that thing is also what acquires the predicates “ascribed in physics.”<sup>43</sup> Husserl mentions the following examples: weight, temperature, electrical resistance, acceleration, energy, atom, and ion. They determine the thing as well as the processes in which it takes part. It is with reference to the results of a causal investigation concerning the thing the experimenters have before their eyes that a “semantic” function of perception reenters the picture.

Imagine that a sample of copper has undergone a huge number of laboratory tests. It has become a part of an electric circuit and has thus been assigned a certain resistance value; it has been subjected to thermometric tests aimed at determining its specific heat, its point of fusion, etc.; it has been in contact with a variety of chemical substances; and, finally, it has become the target of X-rays, gamma rays, etc. Let us assume for the sake of simplicity that these tests can all be performed without destroying or radically altering the sample. Husserl says that that sample of copper, for the experimenters who have that knowledge, is a *sign* for the “wealth of causal properties belonging to the same physical thing which, as causal properties, make themselves known in phenomenal dependencies of familiar sorts.”<sup>44</sup> Hence, for the physicist, the thing that appears is, Husserl says, “so to speak, a sign *for itself*.”<sup>45</sup>

In light of these considerations, the sense of the higher level transcendence of physical theory is now clarified, at least in a preliminary way. It is a hypothetical higher order correlate, which scientists are rationally compelled to postulate in order to explain the results of their experimental activities and which implies “*no reaching out beyond the world which is for consciousness*, or for every Ego functioning as a cognizing subject (singly or in an empathic context).”<sup>46</sup> Very significantly, Husserl declares to have finally solved the problematic relation between the thing

of sensuous *imaginatio* and that of the physicist's *intellectio*. The latter, contrary to what critical realists maintain, is not a theoretical construct aimed at capturing in an indirect and analogical way an unreachable reality laying beyond the appearances. The nature of the physicist is the nature of sensuous intuition theoretically determined, and nothing beyond that. This result suffices to reassure us that the higher order transcendence of the thing of physics, rather than forcing us to accept a different account of the "externality" of the world, can be fully understood in light of the original sense of transcendence acquired with the eidetics of perceptual consciousness.

What has motivated this widespread "realistic" misinterpretation of the status of the thing of physics? Husserl mentions two different factors. The first amounts to an erroneous conception of causality and of the related concept of scientific explanation, while the second amounts to a misunderstanding of the non-intuitive character of theoretical determinations. The next two sections deal with these factors in turn.

## §5. The Mythical Causal Depth of Reality

Considerations concerning causality will become clearer only in light of the constitutive analyses of causation developed in *Ideas II*. However, in §52 of *Ideas I*, Husserl puts forth a claim that can be understood already at this level of analysis, namely, that *the explanandum of physical theory is what is constituted in lived experiences, and not the constituting lived experiences themselves*. Processes such as the aforementioned take place at the level of the constituted units of sense: they involve electrical discharges, changes of color, of phase, of chemical properties, and the like. In other words, causality is a *horizontal notion*: it belongs to the regulated chain of natural events that are ultimately given in perception, and it consists in one of the structures allowing a methodic anticipation of experience on that very terrain. It is mistaken to believe instead that physical theory aims at explaining the "appearances" arising within consciousness: the previously mentioned "instinctive substructions." According to critical realism, physics would try to go beyond consciousness and reconstruct what causes the "ideas in the mind," or the perceptions, somehow, "vertically" or "orthogonally," postulating a causal depth of being that Husserl considers entirely mythical. This habit of thinking, in one way or in another, is common to all modern thinkers who thought that one could infer the existence of an external world from the fact that certain events, often characterized as independent of our will, take place in our mind and demand to be explained. This line of argument is to be found in Descartes, in Locke, and even in Berkeley. Berkeley himself thought that the presence of ideas in the mind had to be explained by a transcendent cause, although he identified that cause with God and not with physical properties inhering in an unknowable substrate as Locke did. As we



have seen, this conception surfaces again in thinkers such as the critical realists. Again, what Husserl is trying to show is that the upshot of such accounts of knowledge is a misguided sense of transcendence, one that goes against the results of the eidetic analysis of consciousness just outlined.<sup>47</sup> Being “external” to consciousness would thus mean to be a reality that is cut off from consciousness in its true being, and that relates to it via a causal relation only. However, causality makes sense only within transcendent units constituted in consciousness. As the following crucial passage explains, a double confusion takes place:

Causality, which belongs essentially to the context of the constituted intentional world and has sense only within that world, is now made not merely into a mythical bond between the “Objective” being which physics determines and the “subjective” being which appears in immediate experience – the “merely subjective” thing pertaining to the senses with the “secondary qualities” – ; rather, by the illegitimate shifting from the latter to the consciousness constituting it, causality is made into a bond between the being which physics determines and absolute consciousness, and, specifically, the pure mental processes of experiencing. In so doing, one attributes a mythical absolute reality to the being determined by physics, while completely failing to see what is truly absolute: pure consciousness as pure consciousness in its purity.<sup>48</sup>

The first part of the passage explains a misunderstanding that already requires insight into the eidetics of perception, namely, that we really perceive things, not ideas or perceptual images, and that the original “externality” to consciousness appears at the level of the direct correlates of perception, not in our theorizing about nature. The transcendence of the direct correlates of perception is acknowledged, but intended as a merely subjective element, determined by secondary properties only, which must be causally explained by recourse to an objective world situated “beyond” it. This kind of confusion gives way to a further misconception that lies at the heart of many modern epistemologies, the consequences of which still hinder understanding of the essence of consciousness. Such epistemologies oppose perceptual mental contents to an objective world that produces them “from the outside.” This situation is explained in the second part of the quotation (after the word “rather”), which describes the mistake according to which there is a causal bond between nature and the sphere of *cogitationes* or, more precisely, between material nature and the *Erlebnisse* of “external” perception. We are now back to where this chapter started, at the point at which everything happens, where the implication of consciousness and reality is decided. The mistaken interpretation of the object of physics is *ipso facto* a mistaken interpretation

of the sense of transcendence, of the way in which transcendence appears, and, therefore, of the way in which we intend it in consciousness. Ultimately, it is a mistake about consciousness itself.

Let us stress that Husserl, by denouncing the absurdity of such an epistemological picture, does not thereby intend to deny that we can find, to some extent, a meaningful relation between what happens in consciousness and what happens in the material world. Obviously, any psychophysical theory of perception does (and must do) exactly that. It investigates how experiences structured in a certain way arise in a subject in correspondence to certain external *stimuli*, in turn produced, at least in the case of "external perception," by causal factors originating outside of the body. To be more precise, the sense organs of a human or of an animal subject must be acted upon by certain physical processes in turn produced by external objects. A chain of events, taking place within the organism and initiated by the stimulation of the sense organs, will then be correlated with the appearance of some "mental events." In *Ideas II*, Husserl will point out that this correlation between physical events and eidetic components of consciousness, such as hyletic data, differs essentially from the causality characterizing intra-physical processes and should to be called psychophysical *conditionality* rather than psychophysical causality. The fact remains that some elements of the stream of consciousness arise in correspondence to events taking place in the subject's body and in turn deriving from events occurring outside the body, where the word "outside" has no mysterious meaning but must be intended in its obvious spatial sense. However, this kind of psychophysical process has nothing to do with the supposed causal bond that Husserl is here denouncing as mythical, and that should account for the "pressure" that a world existing in itself exerts on consciousness. Both the causal processes and the psychophysical conditionality involved in the fact, say, that a human being is seeing an object, occur between transcendencies that are, in the first place, constituted in intuitive acts of consciousness. They belong to the world that is constituted for a community of ego-subjects, among whom we must count the perceiver in question. The object seen is one such transcendency, another is the light source, another the body of the perceiver along with its sense organs, its peripheral and central nervous system and conceived, from the standpoint of the science that Husserl, in *Ideas III*, calls somatology,<sup>49</sup> as an aesthe-siological body endowed with fields of sensations. Finally, yet another transcendency is its psyche, the states of which are the lived experiences annexed to the body, in which the sensations play the role of hyletic data animated by noeses. And these objects, and not others, are then theoretically determined by a physical and psychophysical *explanation* of vision: the light source will be determined as, say, a heated coil emitting photons, the object seen as a complex aggregate of atoms and molecules.

The portion of space in which the entire process occurs will be conceived as filled by an electromagnetic field in which are quanta, or photons, which carry the energy responsible for this kind of perception. Likewise, in principle, following the ideal according to which descriptive natural sciences such as biology and physiology should ultimately be reduced to the fundamental explanatory science of nature (i.e., physics), also the perceiving body could be completely mathematized, determined solely by physico-mathematical predicates. Only the fields of sensations annexed to the physical body and the psychic acts themselves resist, according to Husserl, a mathematical description.

Now, this scientific causal account of perception, interpreted along the lines indicated by Husserl, i.e., by considering the nature determined by science as a theoretical stratum superimposed on the perceived nature, takes place at the only level at which causality (as well as psychophysical conditionality) makes sense, namely, the level of constituted transcendence. Moreover, it is not only completely different from the realist accounts criticized by Husserl, it is hardly intelligible in their terms. Indeed, perception can be studied by science and, in principle, completely understood along the lines just recalled, precisely because the objects and processes that it involves are units of sense constituted in transcendental consciousness.

In the final lines of the last quotation, Husserl draws the conclusion that is most important in the context of the “Consideration Fundamental to Phenomenology.” The mythical physical being of the critical realist is absurdly absolutized because it bears to consciousness a causal relation only. At least implicitly, critical realism assumes that consciousness is just the endpoint of a causal relation, the existence of which is wholly contingent with respect to its source, physical reality. Thus, consciousness is seen as an appendix of the physical world, an annexed, colorful “bubble” causally affected from the outside, and not as the absolute that carries in itself all objectivities.

## §6. Hypotheses About Nature’s Sensuous Determinations and Hypotheses About Nature’s Intrinsic Categorical Determinations

The second motive encouraging the critical realists’ misconception of the sense of the hypotheses of the exact sciences, and along with it, of the essence of consciousness itself, is connected to a cardinal distinction of Husserl’s philosophy, namely, that between sensuous and categorial objects. This distinction is discussed in Chapter VI of the “Sixth Logical Investigation,” the chapter opening the section on sense and understanding and focusing on the relation between sensuous intuitions and categorial intuitions. In order to come to a better grasp of the final part of §52 of *Ideas I*, it will be useful to recall some of the results of that analysis.

The problem stems from the necessity to account for the fulfillment of categorial forms of significations, given that sensuous intuitions are unable to provide it. Already at the level of simple perceptual statements, the objective correlates of categorial forms are not possible objects of sensuous intuitions,<sup>50</sup> but objects given in acts of categorial intuitions founded on the former, which Husserl calls “categorial” or “ideal” objects, as opposed to “sensuous or real.”<sup>51</sup> What is at stake in this set of problems is the characterization of the distinction between sensibility and intellect and of their objective correlates. The analysis carried out in the “Sixth Logical Investigation” shows that intellectual activities and the correlated ideal objects, although of a higher level with respect to sensuous objects, surface already at the stage of the most ordinary forms of knowledge, such as the part-whole relation or the ascription of form or color to an object.<sup>52</sup> Intellectual activities are always at work, as soon as we move beyond the simple apprehension of the material provided by perception. What is given to us is, so to speak, charged with a categorial articulation, which is not itself directly perceivable and, consequently, cannot be represented in the way in which simple correlates of perception are. This holds true for essential reasons, i.e., for reasons that have nothing to do with the contingent structure of human nature.<sup>53</sup> This account of the distinction between sensibility and intellect plays a central role in the following important passage of §52, in which Husserl reconstructs the second reason why the sense of the thing of physics is so easily misunderstood.

A not insignificant influence is exercised in these misinterpretations by the circumstance that one misinterprets the lack of sensuous intuitability which is a property of all categorial unities produced by thinking (and is particularly striking, naturally, in the case of those formed at a highly mediated level) as well as the useful inclination in the practice of cognition to attach sensuous images, “models,” to these unities: that which is not intuitable sensuously is understood to be a *symbolic representative* of something hidden, which could become an object of simple sensuous intuition if there were a better intellectual organization; and the models are understood to serve as intuited schematic pictures in place of this hidden reality having, accordingly, a function similar to that belonging to the hypothetical drawings of extinct living beings which the paleontologist makes on the basis of meager Data.<sup>54</sup>

As we shall see in the next section, this complex passage has also been taken to imply an antirealist stance about the unobservable entities that are postulated by physical theories, for it seems to suggest that, according to Husserl, concepts such as electrons and protons cannot be symbolic representatives of hidden (= unperceivable) realities, and therefore,

unlike the concepts of trilobite or dinosaur, they cannot stand for genuine scientific posits. This, however, is not the intended meaning of the passage. The starting point is the just recalled fact that the categorial unities produced by thinking are never correlates of sensuous intuitions, and that this is a fortiori the case for “those formed at a highly mediated level” by *scientific* thinking. What is important to remark is that, according to Husserl, the idealizations developed in mathematics and geometry, and subsequently employed in physics with a modified sense (mathematical continuity, Euclidean space, points, rigid bodies, vectors, fields, fluxes, etc.), fall in the wide family of the previously defined ideal or categorial objects, which includes, to name but the most fundamental ones, the objective correlates of logical conjunctions, disjunctions, and the copula. If this sounds a bit odd, it is because, while we are used to lumping together logic, mathematics, and perhaps geometry on account of their abstract and symbolic natures, we still tend to regard physics as a rather “earthy” science dealing with something that, by itself, is concrete, or, so to speak, “tangible,” although perhaps not always for us humans. After all, physics, which, let us not lose sight of it, is an empirical science, speaks about the spatiotemporal world, the world of matter and of its components. Even when they venture beyond the realm of macroscopic objects, do physicists not describe “concrete stuff” such as matter, energy, forces that can act on our body, on our sense organs, whose effects are visible in what we see and touch and are essentially different from a logical conjunction or a number? Yet, in order not to be misled by this common intuition, we have to remember that the determining phenomenological criterion to draw a fundamental distinction among classes of objectivities is always the same: what matters is how the objects in question are given to us, i.e., their modality of constitution as intentional poles *ideally immanent to consciousness* (in the language of the *Cartesian Meditations*). The things that surround us and their properties can be seen and touched, while a conjunction, a copula, a number, a triangle, or a vector field cannot. All these objectivities are given only through categorial acts; they are grasped by the “intellect,” not by the senses. This is what they truly have in common: they are correlates of thought and of thought only, of a thought that must be ultimately founded on what is given in sensuous perception. The most fundamental opposition is not, therefore, between “sensuous *imaginatio*” and “physical *intellectio*,” but between the “sensuous *imaginatio*” and “*intellectio*” *tout court*. As we have just seen, we leave the sphere of sensuous contents as soon as we move into the categorial, and, for this, the switch from simple sensuous perceptions to judgements is more than enough (let alone to the judgements of a morphological science such as botany). This fundamental opposition should subsequently help us understand the specificity of physical *intellectio* with respect to other forms of intellectual syntheses.

This is a simple point that does not commit Husserl to some kind of hyperlogicistic view, according to which not only arithmetic and all mathematical theories built thereupon are ultimately constructible out of pure logical notions, such as that of class, but also geometry and the more “concrete” physical concepts (for instance, those of dynamics), which require geometry for their formation. Husserl would not endorse such a view, witness the fact that, for him, geometry is a material, not a formal eidetics, for its laws are rooted in the essence of space and thus do not hold for any object whatever. The “material character” of geometrical determinations, obviously inherited by the determinations of physical theory, is nevertheless not incompatible with their categorial or intellectual nature. We will have to say more on the peculiar character of geometrical idealization, but for now, it suffices to observe that, within the sphere of “ideas,” or “ideal objects,” geometrical idealizations enjoy a specific feature. As we have seen, the “and,” the “or,” and the “is” are in some sense in the sensible world, although they cannot be sensed; likewise, the laws of arithmetic do hold for “real” (i.e., not “ideal”) objects, too. Geometry, instead, can not only formulate ideal laws valid for the spatiotemporal aspects of material nature, but by providing the basis of *all* the so-called primary properties of physics, it can also, so to speak, *turn material nature itself into an idea*: it can idealize material nature completely.

Yet, precisely because the categorial unities produced by theoretical physics lack of “sensuous intuitability,” it is customary to associate some images or models with them. One can think of the several models of atomic structures that were developed in the years in which *Ideas I* was written. According to Husserl, a dangerous analogy with the models used in a science such as paleontology slips into the picture at this stage. We end up thinking that a concept such as that of the atom, which lacks “sensuous intuitability,” is but a symbolic representative for an entity that we cannot directly access due to the limitations of our intellect, and that our schematic models are just a defective modality to represent what exceeds our power of representation. These models would be “insufficient” imitations of the supposedly hidden realities, more or less like the skeletons that we see in our museums are imperfect reproductions based on “insufficient” archeological findings. According to this view, Husserl seems to say, whereas paleontologists would like to use a time machine that could take them back to another geological era, in which they could directly observe what they have tried to reconstruct, physicists would dream of a transformation of their very nature by virtue of which they could (*really*) “see” what the concept of electron “symbolically represents”; they could not only go beyond the veil of human perception, but also beyond the veil of the categorial unities of thought produced by mathematical physics, to directly intuit what material nature really is.

In Max Plank's terminology, they would directly know the real world. Thus, continues Husserl:

One does not pay attention to the *evident* sense of the constructional unities produced by thinking, as *constructional*; and one overlooks the fact that here the hypothetical is restricted to the sphere of cogitative synthesis [*Denksynthesis*]. Not even a Divine physics can make simply intuited determinations out of those categorial determinations of realities which are produced by thinking, anymore than a Divine omnipotence can bring it to pass that someone paints elliptic functions or plays them on the violin.<sup>55</sup>

The recourse to a language reminiscent of the "Sixth Logical Investigation" is here particularly detectable. Just as the "and," the "or," and the "is" cannot be painted, the physico-mathematical concepts cannot be "turned" or "translated" into sensuous determinations of whatever kind. The concepts of theoretical physics pertain to the sphere of the purely intellectual synthesis, which means that their lack of sensuous intuitability has nothing to do with any alleged limitations of our nature. According to this misguided realism, there could be an intuition that allows a *sensuous fulfillment* of the categorial unities of theoretical physics. But this is no less nonsense than a perception presenting a thing without adumbrations. As usual, Husserl resorts to the example of God to underline the eidetic character of a distinction and its unfringeable character. The hypothetical components of theoretical physics (the "categorial determinations of realities," i.e., the idealizations of physics) sharply differ from those of paleontology, as well as from the aforementioned astronomical hypotheses, because they do not amount to "signing a bill" for possible sensuous intuitions. No such intuition will directly pay it back, not even an intuition of which we are wanting. We encounter here a hypothetical element of a purely intellectual nature, whose fulfillment is only in a very mediate way founded upon sensuous intuition. This does not mean that the function of concepts such as "atom" and "ion" is just to assure a coherent description of the appearances, and that nature in itself is unknowable; quite the contrary, this is the right way to understand the *sense of their truth*, which is not translatable into anything that can be sensuously intuited by us or by any other possible subject. The truth of physical theory only determines reality "intellectually."<sup>56</sup> Accordingly, God's physics would amount to the same true, complete mathematical physics that we human subjects strive to achieve, the one that describes matter as it is in itself, in its real, intrinsic nature, *by means of categorial unities of thought*.

Another noteworthy aspect of these passages is that Husserl does not refer to hypothetical beings endowed with a perception more powerful than ours, but with a "better intellectual organization." Why is that?

Why would one entertain the thought that a better intellect is required to sensuously intuit the allegedly hidden realities in question?<sup>57</sup> In other words, why would a deficient intellectual organization limit the range of realities that we can sensuously intuit? The answer must be sought in the deep entanglement between sensuous and categorial intuitions, which appears already at the level of prescientific knowledge. The structure of the objects we perceive, their properties and mutual relations on the one hand and the predicates we use to express them on the other, are closely homologous. In our judgements, we express, we put into words, the essential content (to use Husserl's own terms) of the objects that we perceive as well as of their relations. When Husserl evokes the (mistaken) thought that the categorial unities produced by scientific theorizing would appear to God as "simply intuited determinations," he is not thereby considering the possibility that God would need no categorial intuitions at all, i.e., that the divine subject would constitute reality through acts of sensuous intuition only: a physics "without intellect" would hardly qualify as a science, let alone as a divine one! Rather, the situation is as follows.

We can describe the things of our ordinary experience as they appear perceptually to us, in the relativity of their sensuous appearing; we can formulate judgements about them, and we can express their being so and so in such judgements, because we *understand* them, because their determinations and mutual relations "make sense" to us: sense and understanding go hand in hand. Subsequently, we follow the motivations that force our intellect to give an objective determination of these things, one that is guided by the scientific ideal and, thus, must overcome the relativity of our senses. The perceived thing is now conceived as an aggregate of atoms, molecules, ions, and the like. The judgements that we now formulate about those theoretical determinations are of a completely different kind than are those characterizing the direct correlates of sensuous intuition, because they cannot be fulfilled in categorial acts directly founded upon the acts of sensuous intuition. Of course, they must have their own way of fulfillment if the states of affairs that amount to their objective correlates are to be known at all. However, their fulfillment (or, to use a more common word, their verification) is necessarily highly mediated and involves, besides perceptual activities, acts of measurement, experimental activities, and their interpretation. Indeed, giving an account of this mediated fulfillment would be tantamount to working out the complete theory of constitution of the "thing of physics." Now, according to the opinion that Husserl is criticizing, these theoretical determinations are but symbolic representatives of a hidden reality, which we are unable to *understand* in the way we understand ordinary objects of perception. Instead, for a hypothetical being endowed with a more powerful intellect, such theoretical determinations would be amenable to a direct fulfillment.



Thus, God would be able to cognize the true nature existing in itself, much in the same way as we describe nature as it is directly given to our senses, in its subjective-relative aspects. In other words, true nature in itself would be immediately *understandable* by his superior intellect. This Godly physics would be analogous to our morphological sciences of nature, which do not make use of the idealizations of mathematical physics. If this were the case, however, God's judgements would have to be fulfilled by categorial acts founded upon acts of sensuous intuitions, sensuous intuitions whose objective correlates are the ones we access only as categorial unities of thought, as physical idealizations: God would be able to perceive atoms and molecules and formulate determining judgements about them that amount to the true, ultimate physical theory. This, once more, is absurd: the difference between descriptive-morphological and exact-idealizing sciences<sup>58</sup> has nothing to do with the contingent structure of human subjectivity, and true nature in itself is not an Atlantis that will never reemerge before the human gaze but the perfectly understandable correlate of our intellectual-idealizing activities.

### §7. Criticism of the Interpretations Based on Contemporary Philosophy of Science

The famous §52 of *Ideas I* deserved a detailed commentary owing not only to its importance in the elucidation of nature's transcendence, but also because it has been the object of numerous misunderstandings. In this section, I will criticize some attempts to read Husserl in light of the debate on scientific realism, which has dominated the philosophy of science over the past several decades. Especially within English-speaking philosophy, many have felt the need to understand the contribution Husserl's phenomenology could make to issues currently discussed by philosophers of science, and, chiefly, to the one widely regarded as the most important. As it will appear from the following considerations, such interpretative and philosophical strategies are, for "essential reasons," extremely dangerous.

As is well known, there is no unique formulation of scientific realism. For the purpose of this analysis, however, it will suffice to characterize it in general terms as the thesis that what our highly confirmed scientific theories say about the observable and unobservable aspects of their respective domain of investigation is true or approximately true.<sup>59</sup> This definition is often taken to imply a *metaphysical claim* about the existence of a mind-independent world, the structure of which science strives to describe; a *semantic claim* concerning scientific theories, which are to be understood as bearers of truth values and, thus, as potentially referring to the real world; and an *epistemic claim* to the effect that our scientific methods enable us to access, at least to a certain extent and in

a fallible way, the truth about the observable and unobservable aspects of the world. Traditionally, much of the debate has concerned the status of scientific claims concerning unobservable entities and processes, such as atoms, molecules, elementary particles, and the like. Scientific realists believe that the extraordinary predictive and explanatory success of our best theories give us good reasons to believe that what they claim about unobservable entities and processes is, to some extent, true; antirealists of various kinds deny it. In various forms, these questions are as old as science itself, and, as we have seen in Chapter 1, they were widely discussed by several thinkers during Husserl's time, albeit in the context of a markedly different scientific and philosophical climate.

Let us begin with an article published in 1986 by Charles Harvey, the title of which perfectly epitomizes the aforementioned interpretative framework: "Husserl and the Problem of Theoretical Entities."<sup>60</sup> Harvey's aim is to "develop a phenomenological approach to the issue of unobservables in natural science by considering the mode of resolution Husserl's phenomenology may offer to it."<sup>61</sup> The analysis rests on his interpretation of the previously quoted passage of §52 of *Ideas I*, where Husserl contrasts the hypothesis postulating an unknown planet with scientific explanations using such concepts as those of atoms and ions. According to Harvey's reading of that passage:

Husserl suggests that a dangerous misunderstanding has arisen in relation to (1) the purely formal and symbolic relations of natural science, (2) the would-be "things" unobservable *in principle* that are often postulated by natural science, and (3) things unobservable *in fact*, but not unobservable in principle . . . Husserl is here beginning to suggest that the postulation of an unknown, and as yet, unperceived entity, is a legitimate mode of existence-positing hypothetical explanation, *if* the thing, e.g., the planet Neptune, is perceivable in principle. If the "thing" is not perceivable in principle, however, "after the style of atoms, ions, and the like," then it is really not a "thing" (*Ding*) and cannot function as a mode of *existence-positing* hypothetical explanation. In short, Husserl suggests that category (2) above must be spurned. Existence-postulates which are not perceivable in principle are either misinterpreted purely symbolic formulae belonging to category (1), or symbolic formulae that indicate elements of category (3) – which elements can, of course, be perceived in principle even though they are not perceived in fact.<sup>62</sup>

According to this reading, Husserl's target in §52, as well as in the *Krisis*, is a form of representational realism according to which the things of perception are signs or images of the things of physics, i.e., of the things determined in terms of atoms and ions, which are unobservable

in principle. In other words, Husserl would be opposing the construal of the theoretical terms of physical theories according to which such terms refer to really existing entities, a classical formulation of today's scientific realism. Only things perceivable in principle could be legitimate posits, while concepts such as atoms and ions, Husserl's categorial unities of thought, would only be, along with the mathematical formulae of physics, "pure sign/symbol systems" that allow predicting, *pointing to*, future occurrences of things and processes perceivable at least in principle.<sup>63</sup> Such would be Husserl's antirealism in *Ideas I*, a form of instrumentalism according to which only things that can be directly constituted in perception can be real, while physical theory has only a signitive/predictive function. One could immediately object to such a reading insofar as the latter claim expresses precisely the attitude towards scientific knowledge that Husserl (rather contemptuously) attributed to working scientists, the specialists interested in the formulae and their predictive power only, with no interest in the ultimate structure of reality. As we know, the metaphysical completion of science effected by phenomenology was meant to overcome such unilateral approaches to scientific knowledge (see Chapter 2, §3).

Yet, let us dwell a bit longer on Harvey's interpretation. Harvey argues that, according to Husserl, the reification of the unobservable things of physics is nonsensical for two reasons. First, by turning the perceived things into images or signs of the things of physics, such reification equates the things really existing in the "external" world to unobservable entities, against the necessary correlation between perception and any legitimate transcendency. Second, it leads to the absurdity whereby the perceived things are images and signs of things that, in principle, can never appear.<sup>64</sup> Furthermore, Harvey develops a critique of the point of view he attributes to Husserl, claiming that it is not always possible to establish, on the basis of purely eidetic considerations, whether categorial unities of thought have a mere synthetic/predictive function or whether they refer to entities that are in principle perceivable. Indeed, according to Harvey, "with the constant improvement of scientific instruments, 'egos' are, in fact, learning to see 'better and farther' than ever before."<sup>65</sup> Cloud chambers, for instance, allow us to observe atoms and, thus, to acknowledge that they are not just purely auxiliary concepts as Husserl is alleged on the basis of this reading to have believed. The conclusion is that Husserl's eidetic approach to the problem of unobservables must be supplemented by an empirical investigation into the factual conditions of observability aimed at gradually broadening the range of admissible entities, an investigation that is necessarily empirical in character.<sup>66</sup>

Now, the previous sections provide the elements necessary to understand why this interpretation is wrong. The crucial mistake is to believe

that in §52 Husserl is criticizing a form of scientific realism about unobservable entities according to which theoretical terms actually refer to really existing entities. As I have explained in detail, his target is, rather, what at that time was called critical realism. According to the latter, and Planck's (as well as Brentano's) formulation makes this crystal clear, what exists out there are not atoms and ions, but a completely unknown reality, "a hidden *cause* of the appearances," which the concepts of mathematical physics characterize "only indirectly and analogically." The title of §52 is explicit: the cause of appearances is said to be "completely unknown."<sup>67</sup> If Husserl were criticizing the belief that atoms are the real components of what causes our perceptions (that is, if he were criticizing a standard form of scientific realism), then why would he speak of an unknown cause? Scientific realists, after all, think that, at least to some extent, matter is actually known precisely by means of such concepts and not just in an indirect or analogical way. In light of this, the three-way partition between categories (1), (2), and (3) suggested by Harvey is likewise misleading. Husserl distinguishes, rather, between, on the one hand, the hypothetical, hidden cause of perception, and, on the other hand, two customary and legitimate causal hypotheses, i.e., objects perceivable in principle but not in fact, such as Neptune before its observation, and theoretical posits such as atoms and ions *along with* the purely symbolic formulae describing their properties. A mistake arises when we confound these two legitimate styles of causal explanation and imagine that, behind the concepts of atoms and ions, there lies a hidden reality. What must be spurned is this hidden reality.

Let us now explore the reasons why, according to Harvey, Husserl rejected the existence of entities such as atoms and ions. It is clear that Harvey presupposes that such entities, for Husserl, could exist only if they could be perceived, and this by virtue of the correlation between perception and any conceivable natural transcendency. In this, however, Harvey fails to understand that atoms and ions were never possible candidates for perceptual intuition, precisely because they are categorial unities of thought, or physical idealizations. As such, they require a different, higher order mode of constitution which presupposes their manifestation through the direct correlates of perception. The thing of physics is given only through the thing of perception, by virtue of categorial acts founded on perception. *Between them, there lies a fundamental and unbridgeable difference as to their mode of givenness.* Following this argumentative line, we can appreciate that, when Harvey claims that the things of perception cannot be signs or images of the thing of physics, he is right; however, the conclusion, once more, is not that the thing of physics cannot exist, but that, as we have seen, the same thing is given first as a correlate of perception and subsequently as a correlate of theoretical acts, i.e., that the perceived thing is "a sign for itself."

Harvey's suggestion that the existence of new experimental means, such as the cloud chamber, would force Husserl to modify his conclusions can also be criticized on similar (as well as other) grounds, as can his proposal of a piecemeal empirical supplementation of the eidetics of consciousness. However, it will be best to return to the question of the supposedly shifting boundaries between the observable and the unobservable while discussing a more recent attempt to interpret Husserl's theory of constitution in light of the conceptual resources of contemporary philosophy of science.

In his 2012 article "What Is Wrong With Husserl's Scientific Anti-Realism?" Harald Wiltsche suggests that phenomenologists interested in taking a stance in the current scientific realism debate should join up with Bas van Fraassen's constructive empiricism.<sup>68</sup> Like Harvey, Wiltsche interprets §52 of *Ideas I* as a discussion of "whether or not theoretical terms may be said to refer to unobservable layers of the physical world"<sup>69</sup> in line with how these problems are formulated by philosophers of science.<sup>70</sup> Again, like Harvey, he focuses on the passage concerning the discovery of Neptune, which he takes to imply that only observable entities, such as mountain shelters, and entities unobservable in fact but not unobservable in principle, such as Neptune, are acceptable scientific posits from a phenomenological point of view, while entities unobservable in principle, such as atoms and ions, are not.<sup>71</sup> However, he does not conclude that, according to Husserl, such in-principle unobservable entities *cannot* exist, but rather, that, in line with van Fraassen's constructive empiricism, Husserl would suggest taking an agnostic stance towards them and limiting the aim of science to the formulation of an empirically adequate picture of the world.<sup>72</sup> It is important to stress that, according to Wiltsche, atoms and ions are unobservable in principle, in contrast with planets, because of their extremely small size.<sup>73</sup> Given his premises, it is understandable that Wiltsche should take issue with Harvey's argument concerning the use of new scientific instruments to detect as-yet unobservable scientific posits. Wiltsche rightly points out that, if one adopts Harvey's strategy of liberalizing the notion of observability as to include what is detected through, say, a cloud chamber, the resulting position would amount to a form of scientific realism rather than to a moderate form of instrumentalism.<sup>74</sup> Following van Fraassen, he argues that watching through the screen of a cloud chamber does not allow us to perceive ionized particles, because we must acknowledge "that what we are actually observing are artificially produced trails and that we infer the rest according to our theoretical knowledge about cloud chambers, ionized particles and physics in general."<sup>75</sup> Having dealt with Harvey's argument, he then considers another possible objection to antirealism, namely, that the boundaries between observability and unobservability might entirely depend on our physical makeup. According to this objection, our sense

organs could be so radically modified (for instance, by implanting electron microscopes into our eyes) as to allow us a direct intuitive access to the micro-entities postulated by physical theory. Again, following van Fraassen, he dismisses this objection by pointing out that the belief that such enhanced human beings would be able to perceive, say, a lithium atom, rests on our theory-based, inferential belief that what we currently “see” through an electron microscope is a lithium atom. In other words, we are not to accept the premise that an enhanced human being would be able to perceive atoms and ions.

Now, this last point leads us back to the interpretation of §52 that I outlined earlier. I need not repeat why I think this antirealist reading is incorrect. I would like only to add that the “principle of all principles” that Husserl introduces in *Ideas I*<sup>6</sup> cannot be taken to imply a form of agnosticism with respect to unobservable entities. The same holds true for the aforementioned correlation between thing and thing-perception. As we have seen, perception is demanded for positing material things and material nature in general, but it cannot by itself provide their true determinations, notwithstanding the fact that knowledge of the latter is ultimately grounded in it. Furthermore, if that principle meant that atoms and ions, because of their lack of intuitive givenness, cannot count as legitimate posits, then Husserl would not limit himself to denying that there are sufficient reasons to believe in their existence,<sup>77</sup> for he would claim *that they cannot exist altogether*, as the two following passages indicate:

Of essential necessity (in the Apriori of unconditioned eidetic universality), to every “truly existing” object there corresponds the idea of a possible consciousness in which the object itself is seized upon *originarily* and therefore in a *perfectly adequate* way. Conversely, if this possibility is guaranteed, then eo ipso the object truly exists.<sup>78</sup>

The Eidos, True-Being, is correlatively equivalent to the Eidos, Adequately-Given and To-Be-Evidentially Positable.<sup>79</sup>

In other words, within Husserl’s transcendental idealism, the “principle of all principles” (which is, let us remind it, the fundamental methodological principle of all rational investigations, starting with the transcendental-*eidetic*) cannot be taken to imply a criterion of knowability among putative entities; it does not separate the set of cognitively accessible entities from the set of possible-and-yet-unknowable entities, simply because the latter set is empty.

Having said this, the problem of the boundaries between the observable and the unobservable provides the opportunity to highlight another fundamental difference between phenomenology and contemporary philosophy of science. Philosophers of science have traditionally framed the problem of scientific realism in terms of a series of putative

entities ranging from the ordinary, such as stones, tables, and chairs, to the increasingly problematic, such as cells, viruses, DNA molecules, atoms, subatomic particles, etc. Typically, philosophers of science take for granted that chairs and tables (and planets and stars) are real and then go on discussing whether we are entitled to believe in the existence of objects that are too small (or perhaps too large or too distant) to be accessible to ordinary perception, i.e., objects detectable only by more or less sophisticated observational and experimental means. This was precisely the background of Grover Maxwell's critique of the so-called theory-observation dichotomy in the name of scientific realism,<sup>80</sup> as well as of van Fraassen's response.<sup>81</sup> Different ways of drawing the line between what we are and what we are not entitled to regard as real can be dictated by several kinds of considerations. Van Fraassen, as is well known, draws the epistemically significant line at what can be directly observed by us.<sup>82</sup> The problem for a position such as Wiltsche's is that Husserl's approach to the relation between the thing of perception and the thing of physics is radically different. Husserl does not think that atoms and ions cannot be perceived because they are small, but because, *qua* categorial unities of thought, they cannot be the correlates of any act of perception whatever, and this for unfringeable eidetic reasons. The possibility of subjects endowed with completely different sense organs is not a problem at all for the phenomenological theory of knowledge. Indeed, Husserl believed that our perceptual normality is contingent and that differently perceiving subjects "inhabit" a highly different perceptual *Umwelt*. Perceptual normality, in spite of its fundamental transcendental role, is a relative concept for Husserl, and, as we will see in the next chapter, only the thing of physics overcomes this relativity. However, no matter how differently other species might perceive, no matter how "further and better than us" those egos might see, what would be intuitively given to them would necessarily have to be things of perception, with their spatially prospective appearances and their secondary qualities.<sup>83</sup> Even if God could have perceptions *corresponding* to individual atoms and ions, he would perceive them *as things* and would have to theorize about them exactly as we do, replacing the secondary properties with mathematical, primary properties. More modestly, it is certainly not impossible to imagine that a subject could perceive an individual atom of uranium as a flash of light produced by the emission of a photon by one of its electrons, but even in that case, what is intuitively given would just be a (possibly) colored flash a light, not a physical system described, say, in terms of quantum mechanics. In short, from a phenomenological point of view, the in-principle lack of sensuous intuitability of atoms, *qua* categorial unities of thought, has nothing to do with their size. A chair is a large system of atoms, large enough to be seen by us; but we see a chair, not the system of atoms the chair really amounts to, and even if

we could see a chair as a *pointillé* of minute colorful dots corresponding to atoms and molecules, we would not *see* the system of atoms as a categorial unity of thought, as an idealization situated in a likewise idealized space-time. For this reason, Husserl may well be ready to believe that a cloud chamber gives us evidence of the existence of ions (at any rate, some experimental activities, if not this specific one, must be able to *force us*, as he says, to posit entities of that kind), but neither a cloud chamber nor an alien perception could ever bring those ions to intuitively givenness: the difference between the thing of perception and the thing of physics admits of no degrees because it is founded upon essentially different intentional acts, namely, perceptive and intellectual/idealizing acts. And this distinction has nothing to do with the aforementioned continuum of entities so dear to philosophers of science, ranging from the most ordinary to the most recondite.<sup>84</sup> In conclusion, one could say that, for Husserl, *pace* van Fraassen, atoms and ions are, precisely, *theoretical entities*, and that the aim of science is to discover the true theoretical description of the world.<sup>85</sup>

The last work I will discuss in this section is Lee Hardy's 2013 book *Nature's Suit*, which likewise tries to build a bridge between phenomenology and the current scientific realism debate. This time, however, the attempt is to fashion a Husserl close to a variant of scientific realism inspired by the work of Nancy Cartwright. Let us first stress that, according to Hardy, Husserl's account of the status of the thing of physics has markedly changed from *Ideas I* to the *Krisis*. Husserl's conception in *Ideas I* could be read off from what Hardy takes to be the most plausible interpretation of the identity between the thing of physics and the thing of perception stated in §52, an interpretation which he formulates in the following manner:

The physical sciences seek to determine the imperceptible causal properties of things given in perceptual experience. But in doing so they do not posit a hidden world of imperceptible things. Rather, the imperceptible determinations remain determinations of perceptible things.<sup>86</sup>

In *Ideas I*, Husserl takes atoms and ions to be of the same ontological order as the mechanical properties of mass, force, electrical resistance, and acceleration.<sup>87</sup>

According to this reading, in *Ideas I*, Husserl would assert that physicists' theoretical activities do not *replace* the things of perception with their theoretical idealized counterpart (as is the case according to my reading), but they would literally add theoretical determinations to the things of perception. The second quotation is revelatory regarding what this might mean. In order to attribute properties such as mass, resistance,



and acceleration to an object that we have before our eyes, we do not need to mentally replace it with a completely idealized counterpart that would represent its true nature (not always, at least). These properties are said to be “imperceptible” (presumably, because they can be determined by means of measurement procedures only), but they can be regarded, as Hardy says, as “imperceptible causal properties of things given in perceptual experience.” Now, Husserl, according to Hardy, is suggesting that atoms and ions should also be treated in this way, i.e., literally as determinations of perceived things. Admittedly, such view of the relation between atoms and ions and things of perception would not be easy to defend, and, as the following passage shows, Hardy believes that the thesis he attributes to Husserl is wrong:

Now atoms and ions are classical examples of theoretical entities postulated by the physical sciences in order to explain the lawlike behavior of observable objects. But they are posited not as imperceptible determinations, or properties, of perceivable things, but as imperceptible parts or constituents of perceptible things . . . By categorically reinterpreting imperceptible entities as imperceptible properties of perceivable things, Husserl then makes it possible to claim that the physical sciences deal only with perceivable things. Theoretical entities are not themselves things, but only determinations of physical things that can, in turn, be given in perception. But on this point he is just plain wrong.<sup>88</sup>

This criticism would be well made if Husserl were really making the claim that Hardy attributes to him. In that case, Husserl would be presumably endorsing a kind of positivistic conception of physics. Physical concepts would have, for him, to exert a “phenomenal function” somehow akin to the one attributed to them in different ways by Mach and Duhem. This follows from the fact that it is difficult to understand in what way atoms and ions could be determinations of perceivable things, unless they were conceived as compendious theoretical devices summarizing and predicting a number of perceivable facts.<sup>89</sup> No matter the plausibility and the internal coherence of this position, an obvious objection can be raised against whoever intended to attribute it to Husserl. The previous analysis of §40 in *Ideas I* highlighted that the thing of physics along with its properties is not situated in perceptual space, but in the idealized space of geometry, which completely lacks sensuous intuitability. According to Husserl, believing that primary properties are properties of the perceived thing would imply relapsing into Locke’s old mistaken opinion that such properties would “remain” once the specifically sensible ones, such as color and sound, were removed. How, then, can Husserl make the claim that theoretical determinations are to be regarded as unperceivable properties of the

things of perception? Hardy maintains that this is possible due to a difference between Husserl's conception of geometry at the time of the *Ideas* and his later conception exposed in *Formal and Transcendental Logic* as well as in the *Krisis*.

In the *Ideas* geometry was represented as an eidetic science of space. On the basis of an ideating abstraction performed on the empirical intuition of material bodies, geometry seizes upon the essential spatial structures and relations of the physical world . . . But in the *Krisis*, Husserl maintains that the science of geometry is not based upon an ideating abstraction, an eidetic reduction from spatial fact to spatial essence, but on the process of idealization. This shift is of crucial significance. For the two processes in question here yield categorically different objectivities: one, a universal; the other, an ideal object. Moreover, to the degree that modern physics is mathematical, this shift has direct consequences for Husserl's position on what, precisely, modern mathematical physics is about.<sup>90</sup>

While ideating abstraction produces a consciousness of an essence that admits of instantiation on the part of real individuals, idealization yields an ideal object, or "idea" in the Kantian sense. As a matter of principle, the latter cannot be instantiated by real individuals. It can only be approximated.<sup>91</sup>

If geometry were based on an ideating abstraction, geometrical shapes would be universals and not idealizations, or, as Husserl calls them, *ideas in the Kantian sense*. Universals, of course, can really be instantiated by individual objects, in this case, the things of perception, whereas ideas in the Kantian sense are ideal limits that can never be instantiated in objects given in sensuous intuition. Thus, Harvey believes that, due to his conception of geometry, at the time of *Ideas*, Husserl was led to claim that physical determinations, which all fill out geometrical space, are *in* perceived things *qua* perceived. This is his interpretation of Husserl's thesis of the identity between the two things.

On this basis, he believes that Husserl's modified account of geometry in his later work has led to "a shift in Husserl's concept of the ontological status of the referents of the modern mathematical physical sciences."<sup>92</sup> According to this new conception, physics would itself become a completely idealizing science that replaces the perceptual life-world with a world of idealizations (with the famous "garb of ideas" Husserl talks about in the *Krisis*). All ideal constructs or models that physicists, beginning with Galileo, elaborate to introduce physical laws that exactly apply to them, such as perfectly smooth inclined plains, "incompressible fluids, perfectly elastic bodies, ideal heat reservoirs,"<sup>93</sup> and the like, have the same status as geometrical essences, i.e., they are now regarded by Husserl as ideas in the Kantian sense that cannot be instantiated in the

real world of perception. But, per Hardy's reading, this idealized world, according to Husserl, does not exist, because it is *ideal* and not *real*. The only real world is the one we live in, and idealizations have only the methodological function of allowing a better predictive and epistemic grasp of it, but they cannot themselves be reified. Such would be the great mistake bequeathed to us by Galileo: to believe that true nature is a mathematical manifold and to have reduced to mere appearance the only real world.<sup>94</sup>

This new conception of geometry and the resulting new conception of the thing of physics (that now becomes literally another with respect to the thing of perception, as against the thesis of identity of §52 of *Ideas I*) seems to imply a radically antirealist attitude towards physical sciences. However, Hardy argues, this is not the case. It is at this point that he suggests that there is a close resemblance between Husserl's views in the *Krisis* and Nancy Cartwright's conception of scientific knowledge.

Cartwright claims that a proper analysis of scientific theories will involve not just two elements – theories and reality – but three: theories, models, and reality. Theories are not true of reality; rather, they are true of abstract and idealized models of reality. “My basic view,” she writes, “is that fundamental equations [of a theory] do not govern objects in reality; they govern only objects in models” (Cartwright 1983, p. 129). Models, however, do bear a likeness to reality, and can be applied to reality by way of *ceteris paribus* clauses, the composition of causes, and a series of approximations.<sup>95</sup>

According to this view, theories do not correspond to what really exists in the world, but only to “idealized” situations to which laws apply exactly. With respect to reality itself, laws are not true but only acceptable on the basis of the approximate correctness of their predictions. According to Cartwright, however, this does not mean that the theoretical entities posited by such theories do not exist. By virtue of the role they play in the causal explanations provided by theories, they can be granted real ontological status. This, according to Hardy, paves the way to believe that Husserl's phenomenology at the time of the *Krisis* could be compatible with realism about entities, in spite of its antirealism about the idealized world that theories and laws are supposed to mirror. Here is Hardy's conclusion:

Although Husserl faults modern physics if it thinks that the objects it posits for purely methodological purposes really exist, his critique is not instrumentalist in the standard sense. For his critique is entirely confined to issues that pertain to the conditions of the possibility of exact laws. What he denies really exist are the idealized objects posited in the course of an exact determination of the real. He is

not denying that certain entities posited in theories as real do not, in fact, exist. His critique is primarily categorial, not existential. What he faults modern physics for is taking ideal objects, products of the methods of physics, as if they were original constituents of the physical world.<sup>96</sup>

Let us begin by pointing out that Hardy's account of Husserl's conception of geometry at the time of the *Ideas* cannot be defended. As we know (see Chapter 2, §1), Husserl believed from his very early works on space that the space of geometry is idealized and that geometrical shapes are not instantiated in individuals as are, say, colors. It is even hard to see how he could not think so, since the shapes of normal perceptual objects lack, in principle, the exactness of geometrical concepts, hardly a deniable fact.<sup>97</sup> As a matter of textual evidence, in the already mentioned §74 of *Ideas I*, Husserl is totally explicit on the matter:

Geometrical concepts are “*ideal*” *concepts*, expressing something which cannot be “seen”; their “origin” and therefore their content are essentially other than those of *descriptive concepts* as concepts that express, not “ideals,” but essences drawn immediately from intuition simpliciter. Exact concepts have as their correlates essences which have the characteristic of “*ideas*” in the Kantian sense. Contrasted with these ideas, or ideal essences, we find *morphological essences* as the correlates of descriptive concepts . . . The ideation which yields ideal essences, as *ideal “limits”* which it is essentially impossible to find in any sensuous intuition but which morphological essences “approach” more or less closely without ever reaching them – this ideation is fundamentally different in its essence from the seizing upon an essence by simple “abstraction” in which a salient “moment” is raised into the region of essences as something essentially vague, as something typical.<sup>98</sup>

It is therefore impossible to think that Husserl, in §§40–52 of *Ideas I*, believed that the determinations of physical theory inhere in the thing of perception. The identity between the thing of perception and the thing of physics does not mean that the determinations of the latter, so to speak, flow into the former. Rather, as we have seen, it means that the thing of physics is the thing of perception “transfigured” into a non-intuitive idealized world the spatiotemporal form of which is likewise idealized.

What then about Hardy's account of the *Krisis*? Since I will discuss the famous Galileo section of the *Krisis* in Chapter 5, I limit myself here to mentioning the basic elements necessary to answer this question. Let us begin by stressing that Husserl does not use the word “idealization” in the way that is customary among philosophers of science. For the latter, idealizations are *simplified models* of a particular physical system.

The simplification in question may involve, for instance, abstracting from some properties of the system under investigations, setting some external or internal causal factors to zero, or introducing unrealistic hypotheses about the components of the system (perfect elasticity, perfect rigidity, pointlike objects, perfectly uniform gravitational fields, etc.). In most cases, this is done because, without such simplifications, the mathematical treatment of the system in question would be far too complicated to be handled, or because factoring in some minute causal factors would not alter the predictions in a significant way given the required level of precision or the one allowed by the available measurement instruments. Scientists are aware that these *idealized models* do not faithfully portray what really exists, and that, in some cases, they describe actually impossible situations. Nobody believes that there really are perfectly smooth planes, ideal gases, perfect harmonic oscillators, etc., and to consider them as useful but false representations does not amount to much of an antirealism. Now, this is certainly not the place to assess the validity of the conclusions Cartwright derives from this known fact and which concern the status of physical laws. What matters here is that, when Husserl speaks about idealizations, he does not have in mind these “idealized models”. The essential feature of idealizations in Husserl’s sense is not simplification but *exactness*. As an example, consider the universe described by Laplace (see Chapter 1, §1). In such a perfectly mechanical, classical world, each particle follows a trajectory exactly determined at each instant by the combined effect of all other existing particles. Such a trajectory (a continuous curve in Euclidean space parametrized by time), which is immensely complicated to describe mathematically and impossible to determine in practice, is, in Husserl’s sense, *an idealization*. The process of idealizing nature means only setting the infinite goal of its exact determination, an exact determination that no perception, in essence, can ever achieve. Whether this aim can be successfully pursued at all levels of exactness is a separate issue. In practice, scientists are forced to content themselves with simplified versions of that ultimate, true idealized description; but, again, this matters little for Husserl. Of course, a perfectly smooth surface is an idealization in Husserl’s sense, too, but no more than a surface whose variable curvature is exactly described, at each point, by a continuous mathematical function. Simplifying assumptions are not in question here.<sup>99</sup> As we shall see, Husserl, in the *Krisis*, does not modify the position expressed in §52 of *Ideas I*, nor does he claim that the idealized world of physical theory does not exist.<sup>100</sup>

If we keep this in mind, we understand that, with due qualifications, Hardy’s realism about particles (but not only about particles) is fully coherent with Husserl’s approach. However, once more, we have to consider that these particles would be characterized, in their true being, by categorial unities of thought, or idealizations, in any case not by the

perceivable properties that they might have were they perceivable to a possible subject, as Hardy supposes in his critical discussion of Harvey's paper.<sup>101</sup> Idealizations in Husserl's sense are necessary for characterizing the intrinsic being of material nature, which physical theory strives to capture.

A final aspect of Hardy's interpretation that is important to discuss in the context of this critical overview of the interpretations inspired by philosophy of science is his account of Husserl's transcendental idealism. Since Hardy is trying to fashion a Husserl compatible with at least a form of scientific realism, he takes issue with the idea that, according to him, the world's very existence depends on consciousness. That this denial of what scientific realists call metaphysical realism is hardly palatable to them can be readily understood, since, as we have recalled, metaphysical realism is commonly regarded as a component of scientific realism. Accordingly, Hardy subscribes to the list of authors who have tried to underplay the ontological significance of transcendental idealism.<sup>102</sup> The upshot of his discussion, which it is impossible to reconstruct in full here, is that:

I have been developing a case for the position that Husserl's transcendental idealism is consistent with the basic claims of realism, that is, that things exist apart from consciousness, and the existence of such things is not dependent upon consciousness. Of course one would be rationally unjustified in positing the existence of a thing apart from some consciousness of it. But here what depends upon consciousness is not the existence of the thing posited, but the justification with which we posit its existence.<sup>103</sup>

I need not repeat here the considerations developed in Chapter 2 to the effect that Husserl's phenomenological theory of knowledge replaces all classic metaphysical positions, including realism, with the relativization of the world's being to transcendental consciousness. This chapter has added a number of elements meant to further clarify such a claim. I would like here to add that Husserl explicitly rejects the idea that the correlation between consciousness and being can be understood as a correlation between consciousness and *knowledge* of being, for, as Husserl himself averred, "if consciousness did not exist, not only would knowledge be impossible, but also Nature itself would lose its support, its root, its ἀρχή, and thus it would be a nothing."<sup>104</sup> The reality of whatever goes under the title of nature must be understood in light of claims such as this. There is simply no way to reconcile Husserl's thought with the belief in a reality existing independently of consciousness, and, consequently, with any version of scientific realism as commonly understood in philosophy of science.

## §8. Transcendental Phenomenology and Existence Claims

The preceding discussion has highlighted some misunderstandings deriving from the application of concepts and methods of contemporary philosophy of science to Husserl's phenomenology. However, while it should be clear that Husserl's thought cannot find a place in the array of positions competing in the arena of the scientific realism debate, one can still legitimately ask what phenomenology has to say about the truth of science, and in what way its approach differs from the ones developed within the philosophy of science. What is to be avoided at all costs is the use of conceptual resources deriving from debates about ready-made "philosophical problems" as hermeneutical frameworks to interpret Husserl's thought. It is precisely in so doing that we wreak havoc on the internal articulation of a philosophy meant to generate its own task and method.

Let us begin here by observing that the very formulation of scientific realism mentioned at the beginning of the previous section presupposes a distinction between observable and unobservable aspects of the world, which, as I have tried to show, does not play a fundamental role within Husserl's eidetic doctrine of consciousness. Furthermore, the reference contained in that definition to our highly confirmed scientific theories hides further difficulties. Let us see why.

In Chapter 2, it appeared that the phenomenological theory of knowledge is based on the principle of the absence of metaphysical presuppositions and that Husserl devised the transcendental reduction in order to follow this principle. The aim of this chapter has been to reconstruct how Husserl shows the possibility of the transcendental attitude and of the related eidetic science of transcendental consciousness. The being investigated by the empirical sciences can be elucidated, and such sciences can become metaphysics, only once the world-thesis characterizing the natural attitude is suspended. That nature exists is not a phenomenological claim and even the phenomenology of nature and of natural knowledge does not rest on it.<sup>105</sup> A fortiori, statements such as "tables exist," "electrons exist," or "the theory of relativity is true" are all bracketed by the transcendental reduction. Phenomenology remains uncommitted to any position-taking about them.<sup>106</sup> It does not even take a position on whether the world of perception admits a theoretical determination after the style of mathematical physics, since it is an eidetic possibility that that world could be lacking the motivations necessary for such determination. The true world of physics might simply not exist and the only reality would amount to a subjective-relative *surrounding world*.<sup>107</sup> Phenomenology, *qua* eidetic science of transcendental consciousness, only investigates the *eidōs* of the correlation between possible transcendental consciousness and possible being, without any adjudication vis-à-vis factual reality.

There is, however, a sense in which phenomenology can speak about *factual unreality*, that is, in terms of its principled impossibility. Nothing that violates the *eidos* of correlation can exist: “things that do not appear by adumbrations,” “time-consciousness without retention and protention,” “unknowable being,” “world outside our world,” “world without consciousness,” “hidden cause of perception,” and, finally, “world of physics without world of perception” are so many examples of expressions implying a phenomenological countersense, i.e., expressions that violate the *eidos* of correlation and, therefore, a priori cannot refer to anything real. Phenomenology implies that a kind of entity does not exist if and only if that kind of entity *cannot* exist by virtue of the a priori of correlation. Of course, phenomenology of reason describes the conditions under which posits of a certain kind are justified or not. That a continuous and coherent series of perceptions legitimately motivates the positing of a thing is a result of the phenomenology of reason. Conversely, as we have seen, to posit a transcendency lacking any connection with the subject’s actual perceptual possibilities would be a totally ungrounded hypothesis. In much the same way, phenomenology does imply the claim that, should the positing of a categorial unity of thought lack any experiential support, the belief in such a unity of thought would be unjustified. More generally, a part of the phenomenology of reason would have to detail under what conditions the theoretical determination of the world can produce rationally compelling results, without prejudging anything about which scientific theories are in fact true or false. The determination of the world of perception in terms of mathematical physics does not imply any phenomenological countersense, and, furthermore, it is, in its general form, demanded by reason insofar as the world itself is a rational world, a world that admits of a progressive objective determination. This clarifies also why phenomenology does not face the problem of having to decide whether the real world is the perceived one or the one described by physics. Within the absolute being of transcendental intersubjectivity, both “worlds” are just constitutional layers of *the* world, they are both transcendent constituted poles.<sup>108</sup> The world of physics *cannot exist* without the world of perception and the latter cannot achieve objectivity without the former. Again, these are claims deriving from the a priori of correlation only.

Can then phenomenology put forth any claim concerning our current more or less supported theories? The answer is that eidetic phenomenology, or first philosophy, by itself, cannot do it, but that it can be *applied* to the investigation of what can be rationally asserted about the world on the grounds of the evidence *de facto* available to our intermonadic community. As we know, it is at this level that the positive sciences become branches of universal philosophy, genuine sciences, or metaphysics. It is at this “empirical” level that the specific hypotheses put forth by the different sciences would be evaluated as to their degree of support and



ultimate meaning. Detailed analyses would introduce epistemic differences among our beliefs in various types of entities.<sup>109</sup> As we have seen, a theory of probability and of empirical method was meant to supplement the *mathesis universalis* to produce a specific theory of empirical science. In light of the results of the application of the phenomenological theory of knowledge to the *de facto* available evidence, the degree of certainty of the existence of objects perceivable through a microscope only or of species extinguished millions of years ago will be lower than that of the existence of tables and chairs. These differences point to the contingent embodiment of our species and to its likewise contingent position in space-time. Similarly, even the belief in the most advanced physical theories and in the entities they posit will be less strongly supported than the belief in the recognizable causal style of the everyday world. In other words, at this applied stage, the distinction between what our species can or cannot directly perceive will play a role. However, the phenomenological theory of knowledge prescribes that all beliefs for which there are direct or indirect rational motivations ultimately founded in experience are not completely groundless, whether such beliefs concern potentially perceivable entities or their theoretical determination by means of categorical unities of thought (for instance, by means of concepts such as atoms and ions).

In conclusion, to go back to the standard contemporary formulations of scientific realism, while transcendental, eidetic phenomenology would not make any claim concerning the truth of “our most confirmed theories” (whether this truth concerns what *we* can directly perceive or not matters little), it does prescribe that the aim of natural science is to know the ultimate truth about material nature down to its innermost structure, and that the more a scientific theory is supported by empirical evidence, the more we should believe in it, at least until a better alternative is presented. However, in contrast with today’s scientific realism, phenomenology is radically incompatible with metaphysical realism, if the latter is intended as the claim that the world exists independently of knowing subjectivity. In particular, an ontologically independent world determined by physico-mathematical properties only, in which consciousness may not arise at any moment in time (a notion so dear to contemporary scientific realists and metaphysical physicalists), is a perfect example of phenomenological countersense.<sup>110</sup> Nature is a sense constituted in transcendental consciousness and nothing beyond that. Furthermore, it pertains to nature to be articulated on the two levels corresponding, respectively, to perception (whether human or not) and idealizing theory (which has nothing to do with the subject’s contingent form of embodiment). The second level, the nature of scientific truth (of *episteme*), could not exist without the first level, the nature of perception (of *doxa*), and the latter, in turn, could

not exist without constituting subjectivity.<sup>111</sup> In sum, the phenomenological account of scientific truth has absolutely nothing in common with scientific antirealism, but it is idealistic enough to discontent any scientific realist.<sup>112</sup>

## §9. Summary and Conclusion

While Chapter 2 contained an overview of Husserl's foundational project, its conclusion pointed out that much still needed to be understood concerning the sense of its concrete effectuation. Let us now see how much progress has been accomplished in this direction. The considerations reconstructed here are of an extremely general character and concern the very foundation of transcendental phenomenology. As anticipated, Husserl's strategy in the "Consideration Fundamental to Phenomenology" is such that the progressive uncovering of the region of pure consciousness is carried out by eradicating some particularly harmful misunderstandings concerning the sense of transcendence and the way in which transcendence is disclosed. According to Husserl's general project, the phenomenological theory of knowledge can provide the ultimate elucidation and completion of the positive sciences only because it suspends *and radically interrogates* the general positing of the world characteristic of the natural attitude. As we know, in this way, transcendental phenomenology establishes a foundation free of metaphysical presuppositions. It is important to note that, in the two sections closing the chapter entitled "The Region of Pure Consciousness" (§§54–55), Husserl stresses that neither pure consciousness conceived as absolute being nor the characterization of the world as a unit of sense relative to the being of the former are metaphysical constructions. This separates phenomenology from all the classical doctrines of modern philosophy. No modern theory of knowledge was able to break free from the natural attitude, and, consequently, modern metaphysics resorted to metaphysical constructions such as "substance," "psychological faculty," or "thing in itself." The dualism between pure consciousness and transcendent world is of a completely different nature from, say, Descartes' dualism of *res cogitans* and *res extensa* or Berkeley's immaterialism.

If we now go back to the aforementioned misunderstandings, let us recall that, in the "Consideration Fundamental to Phenomenology," Husserl's main target consists in the epistemologies informed by the results of modern science. Such epistemologies are unable to correctly frame the sense of transcendence and thus to understand themselves because of their inability to abandon the soil of the natural attitude. In other words, the procedures of modern science are such that, without a suspension of the natural attitude, they lend themselves to erroneous accounts which in

turn lead to nonsensical interpretations of the being of the world, such as the one inbuilt in critical realism. That is why, again in §54, Husserl can proclaim:

The real actuality is not “reinterpreted” [*umgedeutet*], to say nothing of its being denied; it is rather that a countersensical interpretation [*Deutung*] of the real actuality, i.e., an interpretation which contradicts the latter’s *own* sense as clarified by insight, is removed. That interpretation stems from a *philosophical* absolutization of the world [*Verabsolutierung der Welt*] completely alien to the natural way of considering the world. This is, precisely, natural; it lives naïvely in the effecting of the general positing described by us; thus it can never become a countersense. The countersense only arises when one philosophizes and, while seeking ultimate intelligence about the sense of the world, never even notices that the world itself has its whole being as a certain “sense” which presupposes absolute consciousness as the field where sense is bestowed; and when, at the same time, one fails to notice that this field, this *sphere of being of absolute origins, is accessible to insightful inquiry* [*schauenden Forschung*] yielding an infinite wealth of cognitions given in insight with the highest scientific dignity.<sup>113</sup>

This removal, however, does not amount to the full clarification of the being of the world, and in, particular, of the sciences of the world.

Our aim here has not been to give a finished theory of that transcendental constitution and, accordingly, to project a new “theory of knowledge” pertaining to the various spheres of reality; our aim has been instead only to bring about insight into certain general thoughts which can help us acquire the idea of transcendently pure consciousness.<sup>114</sup>

In spite of this, we have seen that the removal of the erroneous sense of transcendence underlying critical realism (as well as any epistemology making similar claims about the relation between subjectivity and the world) has allowed decisive progress in the clarification of the scientific description of nature. We now understand what mathematical physics is *about*, i.e., we now understand its general sense of truth and, correlatively, the sense of being it investigates. The solution of the “two things problem” has provided the necessary insight: the task of physical theory is to cognize material nature, i.e., the correlate of sensuous perception.<sup>115</sup> This apparently empty claim contains the solution to countless enigmas and renders intelligible the ideal epistemic goal of a complete theoretical cognition of nature within the framework of transcendental idealism.

Finally, this solution has made visible the unbridgeable gap separating phenomenology and the philosophy of science: they address the question of the epistemic value of physical theory in radically incompatible ways. It has thus been possible to criticize the interpretations of Husserl's thought based on the conceptual framework of philosophy of science. Contemporary philosophy of science too is caught in the natural attitude. It takes for granted the existence of the world and of an embodied subject situated in it. Philosophy of science does not possess the necessary conceptual resources to elucidate the very being of the world, and, thus, remains within the compass of the inferential game that has characterized modernity.

## Notes

1. *Ideas I*, p. XVII.
2. *Ideas I*, p. XXII.
3. For a careful analysis of Husserl's conception of psychology and of its role in the "Consideration Fundamental to Phenomenology," see Jacob 2015. As Jacob points out, Husserl does not reduce the object of psychology to the stream of lived experiences bound to the body; "instead, Husserl claims, psychology deals with the soul, which is a psychological reality (*Realität*), and intentional acts are the soul's states (*Zustände* or *Zuständlichkeiten*)" (Jacob 2015, p. 100).
4. *Ideas I*, p. 370.
5. *Ideas I*, pp. 63–64.
6. *Ideas I*, p. 81.
7. *Ideas I*, p. 113.
8. *Ideas I*, pp. 65–66.
9. *Ideas I*, §33 and §§59–60.
10. *Ideas I*, p. 81.
11. *Ideas I*, p. 82.
12. *Ideas I*, p. 82.
13. *Ideas I*, p. 83.
14. *Ideas I*, p. 83.
15. See, for instance, Wundt 1896, pp. 324–350. See also Külpe 1912, esp. p. 26, also pp. 130–131, where Külpe claims that natural-scientific realism is able to overcome Berkeley's objection to realism.
16. *Ideas I*, p. 83.
17. In order to understand Husserl's claim that for the naïve human being the Ego is as "empty" as the perception, one must recall that the particular eidetic status of the Ego, which is discussed in §80 of *Ideas I*. In spite of its independence with respect to each individual *Erlebnis*, the Ego has no positivity outside of its relation to the stream of consciousness. It can only be grasped as an abstract moment of the former and it can be the object of a phenomenological analysis only insofar as it lives through its *Erlebnisse*: "Aside from its 'modes of relation' or 'modes of comportment,' the 'Ego' is completely empty of essence-components, has no explicable content, is indescribable in and for itself: it is pure Ego and nothing more" (*Ideas I*, p. 191). Thus, if perception is emptied of its essential content, the same holds for the Ego.

18. *Ideas I*, p. 84.
19. “Had we Senses acute enough to discern the minute particles of Bodies, and the real Constitution on which their sensible Qualities depend, I doubt not but they would produce quite different *Ideas* in us; and that which is now the yellow Colour of Gold, would then disappear, and instead of it we should see an admirable Texture of parts, of a certain Size and Figure” (Locke 1975, p. 301). As is well known, Locke also imagines a human being endowed with microscopic eyes, who “could penetrate farther than ordinary into the secret Composition, and radical Texture of Bodies” (Locke 1975, p. 303).
20. *Ideas I*, p. 84. A clear statement of Berkeley’s objection to Locke is contained in the *Three Dialogues Between Hylas and Philonous*: “Can you even separate the ideas of extension and motion, from the ideas of all those qualities which they who make the distinction, term *secondary*?” (Berkeley 1975, p. 152).
21. *Ideas I*, p. 84.
22. *Ideas I*, p. 85.
23. *Ideas I*, p. 85. Husserl refers here exclusively to the space of classical mechanics. However, taking into account the spaces introduced in quantum mechanics and in general relativity would make the gulf between the thing of perception and “physical reality” appear even larger, thus confirming the conclusions of this paragraph.
24. *Ideas I*, p. 85. Emphasis added in the German parts.
25. *Ideas I*, p. 85.
26. *Ideas I*, pp. 92–93.
27. *Ideas I*, pp. 99–100.
28. For a detailed analysis, see Majolino 2016.
29. *Ideas I*, p. 113.
30. *Ideas I*, p. 113.
31. The word “inferring” is missing in the original text.
32. The expression “by acquaintance” is missing in the original text.
33. *Ideas I*, p. 118.
34. That critical realism was a popular doctrine around the writing and publication of the *Ideas* is also documented by Heidegger, who, in the course *Grundprobleme der Phänomenologie (1919–1920)*, contemptuously refers to it: “First of all, we have to take heed of the still increasing influence of the dull unphilosophy of critical realism, which – to characterize it in the best way with a phrase – ‘enjoys a general popularity,’ especially among the representatives of the individual sciences (both natural and cultural) who receive it as a welcome and reassuring philosophical confirmation of their activity . . . It is the philosophy for which all questions somehow derive from or lead back to the question whether the external world really exists or not, and which provides the worried citizen with more and more new scientific proofs that the world ‘actually and truly’ exists. Thus, as one says, an ‘epistemological’ current among others” (Heidegger 2010, p. 7). On the relation between this section of *Ideas I* and critical realism, see also Mohanty 2011, pp. 19–20. Perhaps, in this section, Husserl has in mind also Eduard von Hartmann’s transcendental realism. Vincent Gérard has recently suggested (Gérard 2019, p. 239) such a possibility. This, however, does not modify the sense of Husserl’s following considerations.
35. The word “substruction” is extremely important in several of Husserl’s writings and, most of all, in the *Krisis*, where it designates the mathematical structures that Galilean mathematization has substituted for the world of perception. This subtle terminological inversion should not be overlooked.

“Substruction” derives from the Latin verb *substruere*, which literally means “to build beneath” (another German word for it is “*Unterbau*”). Nowadays, it is mainly used in archeology to designate the underground structures supporting ancient buildings. In this passage of *Ideas I*, in contrast with what will happen in a later passage of §52 and systematically in the *Krisis*, the word does not refer to a product of theoretical reason but, on the contrary, to what is directly perceived, which is intended, moreover, as an instinctive response to a causal stimulus.

36. *Ideas I*, p. 119.
37. *Ideas I*, p. 119.
38. *Ideas I*, p. 119.
39. *Ideas I*, p. 118.
40. Not even that they cannot be known to exist.
41. *Ideas I*, p. 119.
42. *Ideas I*, p. 120.
43. *Ideas I*, p. 120.
44. *Ideas I*, p. 121.
45. *Ideas I*, p. 121.
46. *Ideas I*, p. 121.
47. Similar considerations can be found in Hua XXXVI, pp. 174–182.
48. *Ideas I*, p. 122.
49. *Ideas III*, pp. 7–17.
50. “The ‘a’ and the ‘the,’ the ‘and’ and the ‘or,’ the ‘if’ and the ‘then,’ the ‘all’ and the ‘none,’ the ‘something’ and the ‘nothing,’ the forms of quantity and the determinations of number, etc. – all these are meaningful propositional elements, but we should look in vain for their objective correlates (if such may be ascribed to them at all) in the sphere of *real* objects, which is in fact no other than the sphere of *objects of possible sense-perception*” (Hua XIX/2, p. 667; 2001, p. 278).
51. “Sensuous or real objects can in fact be characterized as *objects of the lowest level of possible intuition*, categorial or ideal objects as *objects of higher levels*” (Hua XIX/2, p. 674; 2001, p. 282). Let us stress that this opposition between real and ideal objects does not imply that ideal objects *do not exist* as if they were some kind of fiction, but simply that they are not there in the same way as the “tangible stuff.” Categorial objects, on the contrary, are introduced precisely to make sense of the objective correlate of a true judgment, namely, a *state of affairs* (see Hua XIX/2, p. 669; 2001, p. 279).
52. “The apprehension of a moment and of a part generally *as a part of the whole* in question and, in particular, the apprehension of a sensuous feature *as a feature*, or of a sensuous form *as a form*, point to acts which are all founded: these acts are in our case of a relational kind. *This means that the sphere of ‘sensitivity’ has been left and that of ‘understanding’ entered*” (Hua XIX/2, pp. 680–681; 2001, p. 286, my emphasis).
53. “What intuitively corresponds to the words ‘and’ and ‘or,’ to ‘both’ or ‘either,’ is not anything, as we rather roughly put it above, that can be grasped with one’s hands, or apprehended with some sense, as it can also not really be represented in an image, e.g. in a painting. I can paint *A* and I can paint *B*, and I can paint them both on the same canvas: I cannot, however, paint the *both*, nor paint the *A and the B*.” Hua XIX/2, p. 688; 2001, p. 291.
54. *Ideas I*, p. 123. Husserl will mention scientists’ use of intuitable models (“*Modelle*”) also in §34c of the *Krisis*, when opposing the intuitable life-world with the non-intuitable “objective-true” world of scientific truth (*Krisis*, p. 129).

55. *Ideas I*, p. 123.
56. As Mohanty rightly points out, “Physical objects and their determinations are correlatives of logical, categorial, theoretical thinking, and therefore are not experienceable in sensory experience, which is misconstrued by being taken as implying unknowability” (Mohanty 2011, p. 21).
57. In passing, let us note that Husserl is not suggesting that a divine physics would be purely intellectual either: this would, again, contradict the eidetic doctrine of consciousness. The “thing of physics,” as we have just seen, can appear only *through* the “thing of the senses” and never “by itself.” In more specifically phenomenological terms, if the world is such that its objective determination is possible, if the perceivable nature is not “the last word,” then this objective determination must be constituted itself as a layer rationally demanded by the motivations offered by perceivable things and processes. That is what it means for the nature of exact science to be, by essence, a higher level intentional correlate, an intellectual determination of the perceivable nature.
58. See *Ideas I*, §74.
59. Standard accounts of the scientific realism debate can be found in Psillos 2000 and Chakravartty 2007. See also Chakravartty 2017.
60. Harvey 1986.
61. Harvey 1986, p. 291.
62. Harvey 1986, p. 296, *passim*.
63. Harvey 1986, p. 299.
64. Harvey 1986, p. 298.
65. Harvey 1986, p. 303.
66. Harvey 1986, p. 305. Harvey develops this point of view further in his subsequent book. See Harvey 1989, especially pp. 207–215. Harvey’s argument about the legitimacy, within a phenomenological framework, of positing micro-objects on experimental grounds is also taken up in Belousek 1998, pp. 82–87, and, yet again, in the absence of a correct understanding of the relation between perceptual and theoretical determinations.
67. Kersten’s translation of that passage is misleading because, as already noted, it adds “by acquaintance” to “completely unknown,” whereas there is no mention of the former in the German text. This inaccuracy is dangerous because the reader might be tempted to think that Husserl is referring to atoms, which are not known by acquaintance.
68. Wiltsche 2012, p. 107.
69. Wiltsche 2012, p. 110.
70. One should not miss that, unlike Harvey, Wiltsche avoids the expression “theoretical entities” that was common before van Fraassen famously argued that conceptual terms are indeed always theoretical, whereas entities can only be either observable or unobservable (van Fraassen 1980, p. 14).
71. Wiltsche 2012, p. 111.
72. Wiltsche 2012, p. 112.
73. Wiltsche 2012, p. 111.
74. Wiltsche 2012, pp. 115–116.
75. Wiltsche 2012, pp. 116–117.
76. *Ideas I*, §24.
77. Wiltsche 2012, p. 112.
78. *Ideas I*, p. 341.
79. *Ideas I*, p. 343. But, as we know, the necessary correlation between thing and thing-perception *does not mean* that atoms and ions cannot exist.
80. Maxwell 1962.
81. Van Fraassen 1980, pp. 13–19.
82. Van Fraassen 1980, p. 18.

83. As we have seen, the contrary belief was at the basis of Locke's mistaken interpretation of the primary/secondary properties distinction (see Chapter 3, §2).
84. The difference between the thing of perception and the thing of physics likewise has nothing to do with a perceiver's contingent biological makeup, nor with any (albeit at a different level) contingent physical principle setting limitations to our possible interactions with microscopic entities.
85. Some years ago, I too made the mistake of suggesting that some of van Fraassen's arguments could be integrated into the phenomenological theory of knowledge (Trizio 2004).
86. Hardy 2013, p. 145.
87. Hardy 2013, p. 205.
88. Hardy 2013, p. 144.
89. Indeed, this seems to be also Hardy's way of reading it as one can infer from a footnote in which he quotes a passage from manuscript D 13 I/106b ca. 1910–1911. Husserl speaks about how physicists necessarily derive from intuitive experience the exact concepts and propositions of their theories, and adds that they must necessarily "translate" them into intuitive situations in order to understand their sense. Husserl concludes, "mere theory is nothing; it only has meaning for the intuitive thing [*Dinglichkeit*], it only has meaning in that it is an index for the regulated behavior of what is intuitively given" (quoted by Hardy 2013, p. 224). I, however, do not read this passage as implying that the exact concepts of physics could really be translated into an observational language and then made redundant in a strict positivistic fashion. Husserl is only pointing out that whatever is not purely formal/mathematical in a physical theory, whatever gives to mathematical language a physical meaning, must ultimately derive from experience. A physical theory, without experience, is just uninterpreted mathematics, or at best a purely geometrical theory.
90. Hardy 2013, p. 149.
91. Hardy 2013, p. 150.
92. Hardy 2013, p. 149.
93. Hardy 2013, p. 156.
94. Hardy 2013, p. 144.
95. Hardy 2013, p. 153.
96. Hardy 2013, p. 161.
97. Indeed, Hardy himself acknowledges that already in the *Logical Investigations* Husserl characterized geometrical essences as ideas in the Kantian sense. Thus, according to him, Husserl changed his mind on geometry at the time of the *Ideas* and then again in the last part of his career. See Hardy 2013, pp. 149–150.
98. *Ideas I*, p. 166, translation slightly modified. Once more, Kersten's translation is misleading, because "*descriptive concepts* as concepts that express" is rendered as "*descriptive concepts*; as concepts they express"; thus rendered, "they" could be wrongly taken to refer to geometrical concepts. For an account of the development of Husserl's view of geometry, see Hartimo 2008.
99. The fact that, in the philosophy of science, the idealized models implying an explicit misrepresentation of an aspect of reality are sometimes called "Galilean idealizations" (see McMullin 1985) might have contributed to this confusion.
100. The confusion between Husserlian idealizations and idealized models is already present in Gutting 1978, pp. 44–47, so much so that, as the following sentence indicates, he criticizes the scientific antirealism that he wrongly believes to be espoused in the *Krisis* (i.e., antirealism about physical



idealizations): “For the modern scientist ideal structures are only instruments for discovering the real mathematical structures of the empirical world” (Gutting 1978, p. 45). The problem is that, according to Husserl, these “real mathematical structures” are, precisely, idealizations, and there is no sense in which he would countenance a principled antirealism about them. What Gutting calls “ideal structures” or “idealized models” (Gutting 1978, p. 44), as we have seen, are, for Husserl, empirically deficient idealizations which in principle should give way to more and more exact ones. This confusion is carried over in Rouse’s criticism of Gutting’s work (Rouse 1987). Rouse even anticipates Hardy’s opinion that there is a kind of kinship between Husserl and Cartwright: “Husserl would agree with Cartwright that the idealizations employed in physics seldom describe accurately any real empirical situation . . . His view of idealizations (namely, that they are empirically false, but predictively powerful because of their broad scope and their approximation to the phenomena) is perfectly consistent with her argument” (Rouse 1987, p. 225). Rouse also anticipates the claim that such an account of idealization, again following Cartwright, is not incompatible with realism about entities. The reader won’t fail to notice that the interpretation here offered rules out also any affinity between Husserl’s views and Arthur Fine’s “Natural Ontological Attitude.”

101. Hardy 2013, pp. 205–206.
102. See, for instance, Woodruff Smith 1995; Carr 1999.
103. Hardy 2013, pp. 178–179.
104. Hua XXXVI, pp. 71–72.
105. “The phenomenologist of the knowledge of nature, as long as he does pure phenomenology, does not judge in any way about nature itself. His task is not to judge about nature, but about the phenomenon nature along with all modes of consciousness in which it may be characterized. If nature turned out to be a phantasmagoria and, thus, something like the objective science of nature an empty illusion, such as Alchemy and Astrology, then the purely phenomenological research and its intrinsic legitimacy would not suffer in the least” (Hua XXV, p. 90).
106. As also Hardy acknowledges (Hardy 2013, p. 192).
107. See the discussion of the two-step annihilation of the world in *Ideas I*, §47.
108. See also Smith 2003, pp. 198–199.
109. Some programmatic indications as to how phenomenology can contribute to the clarification of the conceptual material of empirical sciences can be found in *Ideas III*, pp. 80–90.
110. See Trizio 2018.
111. On this issue, see Chapter 5.
112. Gail Sommer has rightly argued that Husserl’s position cannot be equated either with instrumentalism or with standard versions of scientific realism. Unfortunately, this conclusion is arrived at on the basis of a kind of quasi-Kantian framework incompatible with Husserl’s transcendental idealism. See Soffer 1990, p. 90. More recently, Jack Reynolds has suggested the possibility of a reconciliation between phenomenology and scientific realism (Reynold 2018, pp. 53–83). However, his version of scientific realism does not imply metaphysical realism (Reynold 2018, pp. 76–78), and, more importantly, he adopts a version of phenomenology that is, to put it very simply, not Husserl’s own (see, for instance, Reynold 2018, pp. 41–44).
113. *Ideas I*, p. 129.
114. *Ideas I*, p. 130.
115. As Jacob puts it: “Husserl argues that the object of physical science is the world that we see” (Jacob 2015, p. 105).

## Bibliography

- Belousek, D. (1998). Husserl on scientific method and conceptual change: A realist appraisal. *Synthese*, 115, pp. 71–98.
- Berkeley, G. (1975). *Philosophical Works*. London: Dent.
- Carr, D. (1999). *The Paradox of Subjectivity: The Self in the Transcendental Tradition*. Oxford: Oxford University Press.
- Cartwright, N. (1983). *How the Laws of Physics Lie*. Oxford: Clarendon Press.
- Chakravartty, A. (2007). *A Metaphysics for Scientific Realism: Knowing the Unobservable*. Cambridge: Cambridge University Press.
- Chakravartty, A. (2017). Reflections on new thinking about scientific realism. *Synthese*, 194, pp. 3379–3392.
- Gérard, V. (2019). *Husserl et le réalisme critique*. In: J. Farges and D. Pradelle, eds., *Husserl Phénoménologie et fondements des sciences*. Paris: Hermann, pp. 223–251.
- Gutting, G. (1978). Husserl and scientific realism. *Philosophy and Phenomenological Research*, 39, pp. 42–56.
- Hardy, L. (2013). *Nature's Suit*. Athens: Ohio University Press.
- Hartimo, M. (2008). From geometry to phenomenology. *Synthese*, 162, pp. 225–233.
- Harvey, C. (1986). Husserl and the problem of theoretical entities. *Synthese*, 66, pp. 291–309.
- Harvey, C. (1989). *Husserl's Phenomenology and the Foundations of Natural Science*. Athens: Ohio University Press.
- Heidegger, M. (2010). *Gesamtausgabe. II. Abteilung: Vorlesungen 1919–1944. Band 58. Grundprobleme der Phänomenologie (1919/20)*. Frankfurt am Main: Vittorio Klostermann.
- Hua III/1. Husserl, E. (1976). *Ideen zu einer reinen Phänomenologie und phänomenologischen Philosophie, Erstes Buch: Allgemeine Einführung in die reine Phänomenologie*. The Hague: Martinus Nijhoff; *Ideas Pertaining to a Pure Phenomenology and to a Phenomenological Philosophy, First Book*. F. Kersten (Trans.). The Hague: Martinus Nijhoff, 1983.
- Hua V. Husserl, E. (1952). *Ideen zu einer reinen Phänomenologie und phänomenologischen Philosophie, Drittes Buch: Die Phänomenologie und die Fundamente der Wissenschaften*. The Hague: Martinus Nijhof; *Phenomenology and the Foundations of the Sciences*. T. Klein and W. Pohl (Trans.). The Hague: Martinus Nijhoff, 1980.
- Hua XIX/2. Husserl, E. (1984). *Logische Untersuchungen. Zweiter Band. Zweiter Teil. Untersuchungen zur Phänomenologie und Theorie der Erkenntnis*. The Hague: Martinus Nijhoff; *Logical Investigations*. Vol. II. J. N. Findlay (Trans.). London and New York: Routledge, 2001.
- Hua XXV. Husserl, E. (1987). *Aufsätze und Vorträge (1911–1921)*. Dordrecht: Martinus Nijhoff.
- Hua XXXVI. Husserl, E. (2003). *Transzendentaler Idealismus: Texte aus dem Nachlass*. Dordrecht: Kluwer Academic Publishers.
- Jacob, H. (2015). From psychology to pure phenomenology. In: A. Staiti, ed., *Commentary on Husserl's Ideas I*. Berlin: Walter de Gruyter, pp. 95–118.
- Külpe, O. (1912). *Die Realisierung (Erster Band)*. Leipzig: Verlag von S. Hirzel.
- Locke, J. (1975). *An Essay Concerning Human Understanding*. Oxford: Oxford University Press.

- Majolino, C. (2016). "Until the end of the world": Eidetic variation and absolute being of consciousness – A reconsideration. *Research in Phenomenology*, 46(2), pp. 157–183.
- Maxwell, G. (1962). The ontological status of theoretical entities. In: H. Feigl and G. Maxwell, eds., *Scientific Explanation, Space, and Time*. Vol. 3. Minnesota Studies in the Philosophy of Science. Minneapolis: University of Minnesota Press, pp. 3–27.
- McMullin, E. (1985). Galilean idealization. *Studies in the History and Philosophy of Science*, 16, pp. 247–273.
- Mohanty, J. (2011). *Edmund Husserl's Freiburg Years 1916–1938*. New Haven: Yale University Press.
- Psillos, S. (2000). The present state of the scientific realism debate. *The British Journal for the Philosophy of Science*, 51, pp. 705–728.
- Reynolds, J. (2018). *Phenomenology, Naturalism, and Science*. New York and London: Routledge.
- Rouse, J. (1987). Husserlian phenomenology and scientific realism. *Philosophy of Science*, 54, pp. 222–232.
- Smith, A. (2003). *Husserl and the Cartesian Meditations*. New York and London: Routledge.
- Smith, D. (1995). Mind and body. In: B. Smith and D. Smith, eds., *The Cambridge Companion to Husserl*. Cambridge: Cambridge University Press, pp. 323–393.
- Soffer, G. (1990). Phenomenology and scientific realism: Husserl's critique of Galileo. *Review of Metaphysics*, 44, pp. 67–94.
- Trizio, E. (2004). Husserl e l'oggetto fisico. In: R. Landredini, ed., *Fenomenologia Applicata*. Milano: Guerini, pp. 175–189.
- Trizio, E. (2018). The telos of consciousness and the telos of world history. *Humana Mente*, Special Issue, pp. 77–103.
- Van Fraassen, B. (1980). *The Scientific Image*. Oxford: Oxford University Press.
- Wiltsche, A. (2012). What is wrong with Husserl's scientific anti-realism? *Inquiry*, 55(2), pp. 105–130.
- Wundt, W. (1896). Ueber naiven und Kritischen Realismus. *Philosophische Studien*, 12, pp. 307–408.

## 4 The Transcendental Constitution of Material Nature

### §1. Transition to the Stepwise Constitution of Material Nature in *Ideas II*

In the “Consideration Fundamental to Phenomenology,” Husserl has achieved an initial, general elucidation of the object of physical theory by characterizing the ontological region *material nature* as the sense unit constituted in the acts of sensuous perception of an open community of transcendental subjects. The correct understanding of this result has required overcoming the characterization of nature in terms of an objective “outside” opposed to a subjective “inside,” characterization that has dominated modernity. This opposition, which is *metaphysical* and still rooted in the natural attitude, has been replaced with the *phenomenological* opposition between the different modes of intuitive givenness pertaining, respectively, to things and to *Erlebnisse*: transcendent and immanent perception. The phenomenological characterization of the pair of conceptual terms immanence/transcendence is carried out *within* transcendental consciousness, which, let us repeat it once more, has no outside. Furthermore, it lays the foundation for elucidating the way in which acts of consciousness, by being referred to the *Leib* (which is *also* a material thing), become states of an empirical, worldly reality, entertaining real relations with other natural phenomena. The transcendence of *psychophysical nature*, i.e., of the object of both physical and life sciences, rests on the original transcendence of the material thing as the correlate of perception.

Keeping this in mind, we can begin our analysis of *Ideas II* with Husserl’s general characterization of psychophysical nature:

We begin our new discussions with nature – specifically, with *nature* as the *object of natural science*. Nature, one would say first of all, is the total spatio-temporal “universe,” the total domain of all possible experience: thus we are accustomed to take the expressions “natural science” and “experiential science” as synonyms.<sup>1</sup>

As anticipated (see Chapter 2, §7), a further, fundamental qualification is needed. Nature is the correlate of the possible experiences of a subject that has taken up the *naturalistic attitude*;<sup>2</sup> in other words, “*nature is the field of transcendent – specifically spatio-temporal – realities*,”<sup>3</sup> abstraction made from any practical or aesthetic value. Let us also stress that the naturalistic attitude, in turn, is a type of theoretical attitude, given that nature, in this sense, “is there for the theoretical subject.”<sup>4</sup>

Thus, in this “pure” or purified theoretical attitude, we no longer experience houses, tables, streets, or works of art; instead we experience merely material things. Of those value-charged things, we experience only their stratum of spatio-temporal materiality; and similarly, of men and human societies, only that stratum of psychic “nature” which is bound to the spatio-temporal “Bodies.”<sup>5</sup>

In *Ideas II*, Husserl also reformulates the fundamental distinction between *material nature* (“the lowest and first sense”<sup>6</sup> of nature) and *animal nature* (“nature in a second, broadened sense”<sup>7</sup>). Due to the founded character of the soul in corporality, the first step in the constitution of nature is the constitution of merely material things. The essence of material things is characterized through the eidetic analysis of the acts in which a thing is given to us and of the noemata correlated to these acts.<sup>8</sup> Two preliminary remarks are required to approach the following analyses. (1) The first stage of constitution, which concerns the thing of perception, is carried out with respect to a “solipsistic subject,” i.e., before considering the interplay of different constituting subjects and the formation of an intersubjective world. (2) One may expect that, after introducing the general features of transcendental phenomenology in *Ideas I*, Husserl would directly apply his eidetic-transcendental method to the constitution of nature and to the development of the theory of natural-scientific knowledge. However, as we shall see, while the first two sections of *Ideas II* contain, especially at the lower stage of the thing of perception, several eidetic insights that can be carried over into transcendental theory proper, they remain at a “pre-transcendental” level. Husserl does not carry out the transcendental and eidetic reductions from the outset, in spite of his explicit use of the word “constitution.” Instead, he takes up the naturalistic attitude and characterizes, often in an empirical way, the different steps that the subject of such an attitude must accomplish in order to ground the scientific knowledge of nature (this will become clear in Chapter 4, §6).

Before turning to the different steps that lead to the constitution of the thing of physics, let us sum up the main features of the constitution of the thing of perception. Things are, according to their essence, spatially and temporally extended: a thing is *res extensa* and a *res*

*temporalis*. Furthermore, perceivable properties such as the visual and tactile necessarily fill a certain extension and a certain time span. The thing *is* as a unity in a manifold of actual and possible perceptions constantly synthesized in the internal temporal flux of lived experiences. However, even the essential attributes of the *extensio* and temporality do not suffice to characterize the essence of the thing as an extended material *reality*, because they do not allow distinguishing a real thing from what Husserl calls a *phantom*, i.e., a spatial configuration of sensuous properties (which may pertain even to different senses). Indeed, a thing has causal properties and is thus also a *res materialis*.<sup>9</sup> The question, therefore, is: What is the eidetic trait that a phantom is wanting and that a thing, as *material-real*,<sup>10</sup> has? Correlatively, what is the difference between the apprehension of a phantom and the apprehension of a thing? To be sure, according to its essence, a material thing can move and change. However, this is equally true of phantoms: a phantom, too, can undergo changes of color or shape and modify its position relative to the perceiver. Husserl's answer requires the introduction of the notion of *sensuous schema*, which he defines as "this groundwork, this corporeal ('spatial') shape along with the filling which extends over it."<sup>11</sup> At each moment, the givenness of a thing requires that a spatial extension, a sensuous schema, be given. In other words, the sensuous schema is the most fundamental and necessary level of the givenness of a thing. If we perceive a thing at rest and unchanged, what comes to originary givenness is but the schema. Materiality, in this case, is certainly co-apprehended, but not fulfilled by perception. Adopting a genetic approach, Husserl clarifies this point by adding that if the subject had never experienced the materiality of things then the intuitive givenness of a sensuous schema could not motivate the positing of a thing at all.<sup>12</sup> Now, this apprehension can find its intuitive motivation only if the thing is considered in relation to the surrounding circumstances. It is not by focusing on an ideally isolated thing that we can tell it apart from a phantom, for what we need to consider is the evolution of the different sensuous schemata in their functional dependence on a given set of circumstances. A material property of a thing comes to givenness only as an invariant element in a series of modifications caused by circumstances that are themselves originally given. A certain chromatic aspect, for instance, belongs at each instant to a sensuous schema. But when the aspect of an object changes as a consequence of a variation of the conditions of illumination, we still attribute to the object one single "objective" color that appears differently due to modified optical circumstances. In the same way, a spring has the real property of elasticity, which manifests itself only through a series of regulated modifications of shape determined by external circumstances. The eidetic trait that differentiates a thing from a phantom is, therefore, its being causally

interconnected with the surrounding environment, which amounts, in turn, to a regulated modification of the sensuous schemata pertaining to it. Husserl can thus conclude, “*reality* (or what here is the same, *substantiality*) and *causality* belong together inseparably. Real properties are *eo ipso* causal ones.”<sup>13</sup>

Let us stress two major features of this analysis. (1) The process whereby a thing, in the fullness of its real/causal properties, comes to givenness takes place entirely at the level of perception: both the circumstances and the causalities involved appear at the level of perception.<sup>14</sup> (2) It is necessary to distinguish between (a) *the sensuous schema* (whether changing or unchanging) *pertaining to one sense*; (b) *the full sensuous schema of a thing*, i.e., a synthesis of the sensuous schemata pertaining to the different sense, which Husserl also calls (rather dangerously) *sense-thing*;<sup>15</sup> (c) *the real/causal thing* (which is still apprehended in perception) with its real/causal properties. At each new level, we encounter a givenness as a unity *appearing* in a manifold of elements belonging to the lower level.

## §2. The Thing and the Aesthetic *Leib*: From the Thing of Perception to the “Empty X”

These initial considerations have been carried out not only with respect to a solipsistic subject, but also in a sort of self-forgetfulness of the actual role of subjectivity. A broadening of the focus is now required in view of the constitution of the thing of physics. In particular, we cannot ignore the role played by the aesthetic *Leib* in perceptual life. To be precise, there are two fundamentally different levels at which the *Leib* is involved.<sup>16</sup> The first level was analyzed by Husserl in the course *Ding und Raum* (1907). It is based on the constant correlation between perceptive adumbrations on the one hand and systems of kinesthetic data motivating them on the other.<sup>17</sup> Through a complex and multi-layered process, both the hyletic data and the kinesthetic data are localized in the *Leib*,<sup>18</sup> which is co-constituted along with the perceived things as a transcendent unit necessarily accompanying all perceptions. In virtue of this localization, the *Leib* becomes a system of organs of sensation that the subject can freely move. At this first level, there already appears a fundamental *relativity* of one’s perceptive environment to one’s own *Leib*, notably at the spatial level insofar as each actually perceived or potentially perceivable object necessarily has a position *relative to* the *Leib*, which becomes the bearer of the zero-point of orientation. Every object occupies a “there” with respect to the *Leib*’s absolute “here.”

The constitution of the momentary states of the sense-thing is termed by Husserl “the most original psychophysical conditionality,”<sup>19</sup> for it implies a dependence of the givenness of the thing on the sense organs (opening the eyes, moving the hands, etc.). Further, this conditionality

“becomes the psychophysical conditionality between, on the one side, my *Leib* and its causal interweavings in extra-bodily nature, and, on the other side, the subjective courses of sensation, courses of changing aspects, etc.”<sup>20</sup> Husserl adopts the term “conditionality” to mark the essential difference between a causal relation among thingly realities and a relation involving real/objective elements on the one hand and unreal/subjective elements on the other.<sup>21</sup> The difference between natural causality and psychophysical conditionality is more clearly explored by Husserl in a note published as the second supplement to the English translation of *Ideas II*. The note bears the title “Psychophysical Causality and the Causal Nexus of Things.” In it, Husserl explains that “the physical thing is what it is, i.e., has real properties, only in relation to the causal nexus of physical nature.”<sup>22</sup> If we consider, instead, that any object whatsoever can have an effect on the experiencing subject by being used as a “stimulus-Object,”<sup>23</sup> we realize that, in this way, no further inner real/causal property of the object is constituted. An example may illustrate this fact. A magnet reveals one of its real properties by attracting and being attracted by metallic bodies. Yet, the fact that a magnet can “condition” the emergence of tactile sensations by being in contact with the *Leib* does not contribute at all to the constitution of the inner real/causal properties of the magnet, even though the tactile sensations do contribute to the constitution of the magnet’s tactile sensuous scheme. Of course, if a magnet hits a *Leib*, the way in which the contact takes place and the subsequent reaction of the magnet will indeed contribute to the constitution of the rigidity of the magnet as one of its real/causal properties; but this is, once more, a causality taking place entirely within the natural world. Conversely, psychical causes cannot intervene in the natural causal processes. Husserl’s conclusion is that “the thing and the whole of nature are sealed off.”<sup>24</sup>

The *Leib* is thus at once a real/causal thing embedded in the causal nexus of nature and the bearer of a special relation with psychic life. Each sensation process has a purely physical/causal side interwoven with a psychophysical conditionality linking a natural causal chain with a subjective event.

As we shall see, taking into account the *Leib*’s role in perception is the starting point for the next step of the constitution of material nature. Now, the perceived thing bears a number of actual relations with the perceiver’s *Leib* as a psychophysical unity. In §18 of *Ideas II*, Husserl puts forward a number of examples showing that the appearing material things (which Husserl, reviving an Aristotelian term, calls *Aestheta*) depend on the *Leib*’s embeddedness with respect to its environment as well as its intrinsic functioning as a psychophysical complex endowed with real/causal properties. All examples mentioned by Husserl refer to the distinction between *normal* and *abnormal* circumstances of perception and can be subdivided into four groups. (1) Color perception



depends on the light source and on its position with respect to the *Leib*. Thus, colors change depending on the position of the sun in the sky and on meteorological conditions. Yet, all these perceived colors are apprehended as *aspects* of the normal color seen “in sunlight, on a clear day.”<sup>25</sup> Similar considerations apply if the light source itself is modified. The “normal” color with respect to which we regard any alteration as a mere aspect is also the “optimum” of color perception or the “color itself.”<sup>26</sup> This does not mean that the given color is an intrinsic property of the object, for, as we know, all perceived qualities must eventually be replaced by primary properties; it is the color itself with respect to a certain set of bodily and environmental conditions, which are said to be normal because they provide the reference point for assessing any abnormality. (2) The appearance of things in general, and not only their color, varies according to the nature of the medium interposed between them and the eyes. In this case, looking through air counts as the normal situation, while looking through a glass or wearing colored lenses determine abnormal modifications of the appearances. Similar considerations hold for touch (and, arguably, for hearing).<sup>27</sup> (3) A more significant group of examples concerns the dependence of the *Aestheta* on the state of sense organs. Abnormal changes of the sense organs, such as a blister on a finger or crossing the eyes, determine corresponding perceptual anomalies in the tactile and visual experience, respectively.<sup>28</sup> (4) Finally, another group of perceptual anomalies is produced if a change occurs within the internal functions of the *Leib*, and, specifically, of the nervous system. Husserl mentions here the famous example of the drug *santonin*, which when taken modifies color perception.<sup>29</sup>

These are all examples of deviation from normal perception that reveal the existence of a new level of psychophysical conditionality. The most significant are (3) and (4), for they concern changes in the *Leib* itself. The appearance of the *Aestheta* is *conditioned* by changes in the state of the *Leib* and in a way that differs from the normal conditional dependence of appearances on bodily movements. When the *Leib* undergoes real changes of a certain type, the very qualities that appear in the *Aestheta* are modified. Changes in the *Leib* condition changes in the *Aestheta*. However, as long as we are aware that these apparent changes are connected to real/causal modifications of the *Leib* (as in the case of the intake of *santonin*), we do not apprehend them as actual modifications of the surrounding world, but only as perceptual anomalies. What is noteworthy is that the perceptual anomalies, insofar as they are recognized as such, do not contribute at all to thing constitution.<sup>30</sup> The resulting changes are considered as semblances of the “true things,” which are constituted in the orthoesthetic condition.

Thus, we come to understand that the constitution of nature requires the existence of a normal or “orthoesthetic” psychophysical conditionality

by virtue of which, first of all, the sensuous schemata are harmoniously constituted. It is only because there is a normal state of perception that a coherent world can appear and that deviant occurrences such as the previously mentioned deviations can arise. Husserl's analysis of the interplay of normal and abnormal psychophysical conditions varies depending on whether a solipsistic subject or a subject member of a community is taken into consideration. Yet, the essential point remains the same, viz., that it is possible to realize that the way the external world appears to us is relative to the psychophysical structure of the *Leib*. Even the normality shared by an entire community of subjects in mutual understanding is influenced by the contingent features of their physical makeup. The result is that there is a second, more fundamental sense, in which the things as they are given in perception are relative to the *Leib*, for they are correlates of the perceptual experiences of a subject or community of subjects endowed with a contingent psychophysical conditionality. Understandably, the truth of the judgements grounded in perception is thus, according to its essence, subjective-relative.

We have reached the endpoint of the *perceptual* constitution of material nature. Perception is unable to pursue the process of objectivation because perceptual syntheses cannot overcome the discrepancies arising in a multiplicity of different *Aestheta* relative to perceiving subjects who have different psychophysical structures. Although it might be suspected that the result thus obtained could lead us into a sort of skepticism about the possibility of objectively determining the "external" world, it is precisely at the level of the system of relativities just outlined that it is possible to find rational motivations for a different mode of constitution: the purely intellectual one. The phenomenological strategy here is the same as always, namely, trying to work out what is presupposed when a system of relativities is posited/constituted. As I have already stressed, the crucial point is the difference between normal perceptual life and perceptual anomalies. A subject who had no orthoaesthetic perceptual life at all, a subject for whom the properties of the surrounding things as well as those of its own *Leib*, even the real/causal ones, changed in a chaotic way throughout their perceptual life, would have no rational grounds to assert even the relativity of the world of perception to the psychophysical structure of their own *Leib*. This is why perceptual normality plays such a crucial role. In normal experience, the coherent succession of perceptual *Erlebnisse* constitute *as real existing synthetic units* both the thing perceived and the perceiver's *Leib*. Only once this twofold constitution or co-constitution is accomplished does it become possible to observe the existence of anomalies, which are acknowledged as such on the grounds of what is given in normal conditions, and which, for this reason, cannot modify the properties of what is constituted under such conditions. The effect of anomalies is, rather, to highlight that the *very same thing* that

appears to me in normal perceptual life can appear differently to me if a change occurs in my psychophysical structure. This, in turn, implies that other subjects could apprehend *this very same thing* throughout their perceptual life in a way which would correspond to an anomalous mode of experience for me, and vice versa. In short, the relativity of the things of perception to the *Leib*, the fact that it can exhibit itself differently to different contingent perceptual “normalities,” rationally motivates the *intellectual constitution* of the thing as an *identical something* that is differently “declined” depending on the perceiver’s psychophysical makeup. We observe here an ascent to a new level of rationality and, consequently, of constitution. First, the harmonious normal perception, as a coherent series of originarily presenting acts, constitutes the “aesthetic thing” as existing. Subsequently, the intellectual constitutional activity works out from what is given in perception the idea of a higher order objective pole invariant through perceptual relativity. The second step, which marks the switch from perceptual to intellectual constitution, amounts to the replacement of the thing with an empty X, referred to already in the §40 of *Ideas I*.

In that paragraph, the original transition to the modality of theoretical constitution typical of mathematical physics was not investigated. Therefore, the empty X was, without further ado, deemed to be the bearer of theoretical determinations, too. In the context of this analysis, Husserl does not hide that, at the level of this early constitutional stage, we know nothing of this *identical something* that we are rationally compelled to posit. This explains why Husserl resorts to a general principle of formal logic according to which any “identical something” must be determined by a stock of properties that belong to it:

If the thing is (and concordance in the positing of the being within the nexus of experience is an original ground or reason for the assertion, “It is”), then it must be determinable in a way which determines what is non-relative from among the relativities and, on the other hand, determines it out of that which contains all grounds of right, out of the data of experience, thus out of sensuous relativities. Of course, experience does not exclude the possibility that it be annulled by future experience or even that the real not be at all, though it had been given in a concordant way. But now there are rightful grounds for positing being and consequently for the possibility and necessity of positing the goal of logico-mathematical determination.<sup>31</sup>

Here, the *necessity* of logical-mathematical determination is still introduced rather abruptly, thus more will have to be said about it in due course, but at least the very question of what motivates it has not been avoided.<sup>32</sup> For the moment, a decisive step towards the elucidation of the

scientific knowledge of nature has been made. By including in the constitutional analysis of material nature the reference to the *Leib*, we have acknowledged that the acts of perception in which nature is constituted are affected by a relativity involving the perceived things on the one hand and the *Leib* on the other. We have further acknowledged that, in order to overcome such relativity, we have to divest the thing of its sensible qualities and replace it with an empty X, the properties of which still require characterization.

### §3. The “Empty X” and the Objective Space as the Form of All Possible Things

In order to constitute the fully objective *natural objectivity*, that is, ideally, the thing as it is in itself for any rational subject, it is necessary to decide along which lines its constitution can take place. Clearly, if such constitution is to be possible at all, the relativity of the *Aestheta* to the perceiving subject cannot imply that the perceived thing is a mere illusion, nor that experience does not provide the elements necessary to progress towards its intellectual determination. That the perceived thing is no mere illusion has already been established, for the reality of the empty X exhibits itself in sensuous perception, i.e., in an originally giving act. Yet, how can we predicatively “fill” the empty X? The answer is that the empty X must be determined solely as the substrate of *primary properties*, that is, of causal properties that are essentially *mathematical* in character. If, then, physical theory, following the rational motivations of experience, avails itself of hypothetical entities such as atoms and particles, those entities will be the ultimate bearers of primary properties and will fill a mathematized space-time.

Chapter 3 of *Ideas II* contains an account of the constitution of primary properties that anticipates in some respects the analysis of the Galilean mathematization of nature developed in the long §9 of the *Krisis*. Husserl’s indications can be best spelled out by considering the constitution of the thing of physics at the intersubjective level, although in *Ideas II* he insists that the “solitary” subject could also achieve it, at least in principle. The starting point is distinguishing, already among the eidetic traits of the perceived thing, between the spatiotemporal and the specifically sensible ones.<sup>33</sup> A thing, as it is perceived, is always “something *spatiotemporal* from the first, having form and duration and also having a position in space and time.”<sup>34</sup> As we know (see Chapter 3, §2), these determinations are not to be identified with their idealized geometrical counterparts because, insofar as they are perceivable, they cannot be thought without sensible fillings like colors and tactile qualities. Thus, *all* perceivable properties must be replaced by ideal-mathematical ones. Nevertheless, according to Husserl, the spatiotemporal form of perceived

objects, and specifically the spatial form, must be granted a privileged status. This was already implicit in the previous discussion vis-à-vis the positing of the empty X. Let us see why.

To each subject there corresponds a space oriented with respect to its own *Leib*. However, a community of subjects constitutes an objective space in which each “here” and “there” are interchangeable, in such a way that an object does not only have a position with respect to an individual subject’s *Leib* but also has an objective position in a single, shared space, which is no longer oriented. This space is a single unified system of locations in which *every Leib as well as the perceived things have their definite place*. Husserl’s characterization of this concept is extremely important:

Always and necessarily, however, the one and the same space “appears” as the form of all possible things, a form that cannot be multiplied or altered . . . This is an ideal necessity and constitutes an Objective system of location, one that does not allow of being grasped by vision of the eyes but only by the understanding; that is, it is “visible,” in a higher kind of intuition, founded on change of location and on empathy [. . . *das sich nicht sinnlich sehen läßt, aber verstehbar, bzw. in einer höheren Anschauungsart, gegründet auf Ortswechsel und Einfühlung, “erschaubar” ist*]. In this way is solved the problem of the “form of intuition” and of spatial intuition. It is not a matter of the senses, although in another respect it is [*Sie ist unsinnlich und doch in anderer Hinsicht sinnlich*]. The primary intuitive space is sensuously given though this is not yet space itself. Objective space is not sensuous, although it is still intuited on a higher level, and it comes to givenness by means of an identification within a change of orientation, but exclusively one the subject itself carries out freely. Oriented space (and along with it, *eo ipso* Objective space) and all appearing spatial forms already admit of idealization; they are to be grasped in geometrical purity and determined “exactly.”<sup>35</sup>

That the *one* objective space in which all possible things are situated “is not sensuous” means that it cannot be treated on an equal footing either with the sensuous oriented space centered on a subject or with the qualitative eidetic traits of the *Aestheta*. On the other hand, Husserl says that it can be *understood*. While the use of this word in such a context may not be entirely felicitous by itself, the English translation, by opposing the “eyes” to the “understanding” (both missing in the original text), wrongly gives the impression that the constitution of such space would be intellectual and would require the transition to a different faculty. This, in turn, might generate confusion with respect to the subsequent level of

constitution, the one involving idealization and lying altogether beyond sensibility. We need, instead, to observe that, while this objective space cannot be the object of direct perceptual intuition, it can still be seized upon by means of a kind of founded intuition, the founding “acts” of which are changes of location and empathy. It is not *perceived* as colors are, for it comes to givenness only via the constitution of a system of location invariant with respect to changes of orientation. In other words, it comes to givenness with respect to real or imagined movements of the *Leib*, whereby the subject is able to take up the other subjects’ points of view on the same thing, thus making the “here” and the “there” interchangeable. “Change of location” is of course not the title for a family of intuitive acts; rather, it must be regarded as a shorthand for a complex series of perceptions correlated to likewise complex series of kinesthetic data, to which the transformation from the “there” to the “here” corresponds. Since the “there,” in this case, is the position of another subject’s body, the one whose point of view is really or imaginatively taken up, a synthesis of identification can occur between the empathized oriented space of another subject and the oriented space actually perceived at the end of the change of location. Husserl sums this situation up by saying that the intuition of space is in one respect non-sensuous and, in another, sensuous. The *oriented*, subjective space is sensuous, while the *uniform*, objective space is not, but the latter is still, in its own way, intuited.

The subjective-relative character of sensuous properties rests on their dependence on the subject’s contingent bodily constitution. We may, for instance, imagine a subject who sees colors in a completely different way, or who is even completely colorblind. Yet, insofar as a subject can be said to share our world (and, to be clear, there is no *other* world), to be *in* our world, its senses must be able to locate its own *Leib* as well as our *Leib* and to make sense of the “here” and the “there.” Hence, they must be able to constitute space as *the* single objective system of locations of all things, and, along with it, objective time and motion.<sup>36</sup> Therefore, in contrast with the sensuous qualities of perceivable things, the existence of the objective space in which these things are situated *is not relative* to the contingent structure of the perceiver’s body: objective space is, quite literally, *every-body’s space*.

In this way, we come to realize that the empty X, the *identical something*, was posited from the outset in this objective space, along with the imagined differently embodied subjects to whom the empty X appears endowed with different secondary qualities. Thus, we are able to understand the claim made at the end of the previous section, namely, that there are *grounds* for the “possibility and necessity of positing the goal of logico-mathematical determination” of the empty X.

The objective but not yet idealized space is the link between what is given to us in perception and the idealized language of physics, as the

last sentence of this passage suggests. Both oriented and objective space can be idealized. Recall that the perceived thing was hollowed out of all its perceivable properties because sensuous spatial properties are inseparable from the specifically sensuous ones, which are subjective-relative. However, once the uniform, objective space is geometrized, the spatial properties of the perceived thing, which are situated in this objective space, are likewise geometrized. Thus, they reappear in the idealized space and regain therein their privileged status. The same conclusions hold true for time and motion. This is what Husserl, in the *Krisis*, will call *direct mathematization*. Important consequences for the next steps of the constitution of the thing of physics follow from here.

The *Objective form* [Gestalt] is Objective as ordered within *Objective space*. Everything *else* about a thing that is Objective (detached from all relativisms) is so through a connection with what is fundamentally objective, viz., space, time, motion. Real properties manifest themselves as real substantial-causal unities in the motion and deformation of the spatial form [Gestalt]. These are the *mechanical properties* which express the causal-lawful dependencies of the spatial determinations of bodies. The thing is always *form* [Gestalt] in *a situation*.<sup>37</sup>

Mechanical properties, which exhibit themselves in the regulated series of changes of positions and deformations of things, inherit the objectivity of this spatial form and admit of a direct mathematization, too. Instead, real-causal properties, such as colors or heat, which are not immediately understandable in terms of space, time, and movement, can be mathematized by causally explaining them via the effects of real physical phenomena occurring in objective space.

The form [Gestalt] is, however, in every situation a *qualified* one. Qualities are what fills, they extend over the surface and through the corporeality of the form. *Qualifications*, however, extend from the things into “empty space”: *rays of light, radiations of heat*, etc. That means that thingly qualities condition qualities and qualitative changes in other things and indeed do so in such a way that the effect is a constant function of the situation: to every change of situation there corresponds a change of effect. In virtue of such a subordination to spatial relations which may be determined with exactitude, even the sense qualities become amenable to exact determination.<sup>38</sup>

This passage contains a very sketchy version of what in the *Krisis* is called *indirect mathematization*. It is not, however, extremely clear. Initially, this passage suggests that there are causal relations among qualities.

However, this quality-to-quality correlation, no matter how regulated, does not lead to a mathematical characterization. The sentence “in virtue of such a subordination to spatial relations which may be determined with exactitude” explains what Husserl has in mind, i.e., what he will explain in detail in the *Krisis*. There have to be causal connections between changes of qualities and changes occurring in the realm of spatial relations, which can be directly mathematized, and, by virtue of such connection, also the specifically sensible qualities become “amenable to exact determination.”

In some sense, between the real/causal property of the elasticity of a spring and the real/causal property of objective colors, which were first introduced at the same level of objectivity, there is a difference that grants the former a privileged objective status with respect to the latter. The privilege of mechanical properties derives from their spatiotemporal character, which is a necessary form of all natural things, and processes that can be experienced by any possible subjects.<sup>39</sup>

The privilege of space and, secondarily, of time is of fundamental importance to dispel the suspicion that there are no a priori phenomenological grounds motivating the geometrization of material nature. That this is not the case follows precisely from the fact that the necessity of a final, ultimately objectifying constitutional level stems from the relativity of the *Aestheta* to the *Leib*. Such relativity obviously implies the existence of the *Leib* and of the space containing it. It is only within what I have called every-body's space, only in virtue of the real processes that can occur in it (from the interposition of a colored medium to the ingestion of santonin) that the specifically sensible qualities of material things manifest their dependency on the objective circumstances surrounding the acts of perception in which these things are given. Thus, the very intellectual operations justifying the relativization of the *Aestheta* to the *Leib* presuppose the structures that make possible for the empty X to receive its new content, namely, space, time, and causality. Only in the absence of a correct phenomenological analysis of such structures and of their relation to the *Leib* does the mathematization of nature appear as an arbitrary move. The thing of perception is not emptied of “all its essential content” in a field of perception that, so to speak, floats free within our mind, beyond which one would have to reach for the really existing things of physics. Rather, such intellectual dismantling of perceivable qualities occurs in the real worldly nexus of causality in which the *Leib* is situated.

Note, further, that this “logical objectivity,” as Husserl calls it, does not arise in the way in which each successive layer of the perceived thing does. As already stressed, a fundamental discontinuity in constitution occurs at this stage. Take, for instance, materiality. It manifests itself through the regulated changes of sensuous schemata. It is a synthetic unity



*perceptually intended* through certain regulated changes of schemata. The leap into the determinations proper to theoretical physics is different. The things of physics are not identical elements manifesting themselves over and above the conflicting secondary qualities perceived by two different subjects, or by the same subject in different psychophysical conditions. The conflict among secondary qualities cannot be overcome at the level of perception and, thus, does not lead to any other higher level perceptual unity. This fact justifies the necessity to transition to a new modality of constitution.<sup>40</sup>

Summing up, we have seen that the first stage of the constitution of material nature abstracts from the role of the *Leib*, that is, from animal nature. Subsequently, material and animal nature must be considered together *as thing and Leib*. It is within nature intended in this broad sense that the relativity of perceivable properties arises. The *Leib* on the one hand makes possible the constitution of the objective space of nature in which both things and the *Leib* are situated and, on the other hand, is responsible for the fundamental subjective-relative character of perception. With the establishment of the distinction between primary and secondary properties, the constitution of material nature enters its final stage. Consequently, there appears yet another level of identity in the manifolds of appearances, one which, as I have just stressed, is purely intellectual. The thing of physics is not relative to the perceiver's *Leib* and is an identical element exhibiting itself in the different *Aestheta* appearing to subjects endowed with different psychophysical structures.<sup>41</sup> Nature is, thus, fully objectified, for mathematical idealities are the same for all possible subjects<sup>42</sup> and are free from any relativity to the *Leib*.

Thus we come to an understanding of the physicalistic world-view or world-structure, i.e., to an understanding of the method of physics as a method which pursues the sense of an intersubjectively-Objectively (i.e., non-relative and thereby at once intersubjective) determinable sensible world.<sup>43</sup>

#### §4. Physical Theory as the Ultimate Objectivation of Material Nature

In the subsection 18g of *Ideas II*, Husserl summarizes the results of his analysis:

“Physicalistic nature,” to which we have now advanced, presents itself in the following way in accord with our expositions: *the thing itself in itself* [*das Ding an sich selbst*] consists of a continuously or discretely filled space in states of motion, states which are called energy forms. That which fills space lends itself to certain groups of

differential equations and corresponds to certain fundamental laws of physics. But there are no sense qualities here. And that means there are no qualities here whatever. For the quality of what fills space *is* sense quality. But, now, filled space without quality, how is that thinkable?<sup>44</sup>

Let us unpack this text by supplementing it with the results of our previous discussion. The *very thing in itself* (I would prefer this rendering of the German expression) is what a physicist would call “a physical system,” which fills the idealized, physical space. This physical system fills space, Husserl says, “continuously or discretely.” This means that Husserl leaves open (for empirical research to solve) the alternative between the corpuscularist and the continuist conception of matter.<sup>45</sup> Material objects can resolve either into particles or into fluxes of continuous matter. In the former case, the ultimate “primary properties” will be carried by the particles *qua* fundamental discrete units of reality, while, in the latter case, they will be attributed through density functions defined at each point in space. Classical physics has developed sophisticated theories to describe both types of physical systems. Within mechanics, this distinction is reflected by the mechanics of physical point and discrete systems of points, on the one hand, and the mechanics of fluids, on the other. The latter was carried into the physics of fields and waves that, as we mentioned in Chapter 1, became so important by the end of the 19th century. Further, these substructured space-filling “determinations” evolve over time in the substructured mathematized time of physics according to a strict causality, i.e., according to physical laws. At each instant, what fills space has a state of motion. The evolution of the physical system is described by the solution of the differential equations which are defined by physical laws. Two points should be stressed. First, the expression “state of motion” seems to indicate that Husserl is sticking to a mechanistic picture, but this need not be the case. The fluctuations of an electromagnetic field may also be included in this idea of motion. Second, it is more difficult to make sense of the idea that a state is called an “energy form.” In terms more familiar to us, this would mean that to each state a certain value of an energy form is associated.

This brings us back to Husserl’s text, which stresses once more that all qualities are excluded from the thing of physics *in spite of the oddness of a quality-less filled space*. Subsequently, Husserl insists on the necessarily subjective character of secondary qualities by compressing in a few lines three different arguments supporting it. First, he mentions again their already established dependency on the perceiving embodied subject and on its contingent psychophysical structure as well as on its changing state. Second, he adds a more technical, empirical argument derived from the psychophysical experiments of the time and often used by critical

realists themselves, i.e., that sharply different perceivable qualities, such as red and green or warm and cold, correspond to “true physical facts” that “are *produced* without qualitative transition as mere quantitative distinctions of one and the same domain, for example, temperature, waves in the ether, etc.”<sup>46</sup> For instance, different color perceptions can be produced by heating up a sample of metal.

Husserl’s third argument rests on yet another recourse to the hypothesis of a divine subjectivity. The question is whether the fact that nature is given in the garb of secondary qualities is due to an intrinsic limitation of the human subject.

Shall we say that God sees the things as they are in themselves while we see them through our sense organs, which are a kind of distorting eyeglasses? The things are filled space with *absolute quality* and it is only that we know nothing of it?<sup>47</sup>

Can we imagine at all a subjectivity that has perceptual access to an intrinsically qualitatively determined material nature? The qualities hypothetically perceived would be “absolute” in contrast to the ones we perceived that are the result of a distortion produced by our sense organs, i.e., they would be the objective correlates of an ideal perception. If that were the case, these intrinsic qualities would not be accessible to us. Although this time Husserl does not say it, it would also follow that our physical theories degrade to theoretical “means of fortune” that allow intersubjective understanding and empirical mastery over nature without yielding ultimate objective truth.

Instead, Husserl proceeds to unpack the eidetic implications of this hypothesis on implicitly transcendental ground. Realists of all kinds have not understood that the very being of a lasting entity manifesting itself to a multiplicity of subjects must be made into a problem the solution of which is provided by the theory of constitution. They are bound to reason as if an entity, in this case a material thing, can first exist and then come into “epistemic commerce” with different kinds of subjects. One can thus understand Husserl’s dismissal of the aforementioned doubt: How could we say that God and us are perceiving the same object, which appears at the same time shrouded in clouds to us and fully unveiled to him, if not through mutual understanding? God and us should be members of one intermonadic community in which the co-positing of that thing takes place. A certain level of mutual exchange concerning the appearances would have to be possible in spite of their differences. Thus, God would need to have a body, and his perception, however different from ours, would have to be mediated by sense organs. But then, the qualities he perceives would not be absolute at all and would have to be replaced by physics. Physics would set for

itself the task of turning the mere intersubjectively attestable identity of the perceived thing into a complete categorial identity that excludes all subjective discrepancies, for physics “has to be the same for all if the things are the same.”<sup>48</sup> This recourse to a divine subjectivity supplements the one contained in §52 of *Ideas I*, which was discussed in Chapter 3. The aim there was to highlight the fact that we do not use the language of physical theory because we fail to grasp how things are in themselves, and that even a divine subject would not perceive qualities that we only indirectly characterize by means of such a theory, nor would such a subject be able to describe them with a “divine physics.” What is now stressed is that the very idea of “true qualities” does not make any sense. The distinction between perceivable and idealized properties, once more, has nothing to do with contingent features of the human subject.<sup>49</sup>

If a community of mutual understanding is possible, then each of its members must be able to experience the *Leib* of the others and to situate them in the same space in which its own *Leib* is situated. There thus arises a multiplicity of qualitatively filled space-apperceptions in which all members of the community are included through their corporality. In conclusion, Husserl answers the question he formulated at the end of the previously quoted passage:

The Objectively real is not in my “space,” or in anyone else’s, as “phenomenon” (“phenomenal space”) but exists in *Objective Space*, which is a formal *unity* of identification in the midst of the changing qualities. Whereas it holds for my space-phenomena that they can only be given with sensuous qualities, it holds for Objective space that it cannot be given with sensuous qualities but can appear only within subjective spaces that have sensuous qualities.<sup>50</sup>

Situated in this pure idealized space, the thing of physics is a “unitary rule for all appearances”<sup>51</sup> having an absolutely general intersubjective validity. Its properties are through and through causal properties that determine the regulated course of all possible appearances.

Finally, let us add that Husserl’s insistence on the fact that the thing of physics appears through the thing of perception does not mean that to any hypothetical physical entity there must correspond a perceivable thing in the ordinary sense. Even theoretical posits such as gravitational waves, or cosmic radiations, or dark matter, for which such perceivable counterpart is missing, are no threat to Husserl’s account. Physical theory requires that the entire space-time be mathematized from the outset, and physicists are free to populate such mathematized space-time with whatever entity experimental results demand. What remains true is that mathematized nature, as *a whole*, appears through perceivable nature.

## §5. The Relation Between Husserl's Conception of Material Nature in *Ideas I* and *Ideas II* and the *Krisis*

The present reading of the constitutive analyses of the thing of physics stresses their continuity with §40 and §52 of the first volume of *Ideas*. Indeed, I take §18 of *Ideas II* to be a genuine attempt to carry forth the program outlined in *Ideas I*. The differences between the two expositions have to do with their different aims rather than with any alleged evolution of Husserl's views. In fact, in *Ideas I*, all that was in question was the possibility of the constitution of the thing of physics and, thus, the sense of its transcendence.

This interpretation significantly differs from the one proposed by Bernhard Rang in his previously cited work. According to Rang, Husserl's position on the ontological value of physical theory was constantly evolving between *Ideas I* and *Ideas II* and between *Ideas II* and the *Krisis*, with this evolution taking place under the conflicting influences of Helmholtz and Mach. Husserl's own views would decidedly lean more towards Mach's project of a phenomenological (or, better, phenomenalist) physics, which, so Rang believed, was outlined in §52 of *Ideas I* and reformulated in more radical instrumentalist terms in §9 of the *Krisis*.<sup>52</sup> The "natural-scientific realism" of *Ideas II*,<sup>53</sup> meanwhile, would be the sign of Husserl's inability to break free from Helmholtz's influence, as is also attested by his account of color perception.<sup>54</sup> The source of this interpretation (as of the others criticized in Chapter 3, §7) lies in the antirealist reading of §52 to which I have provided an alternative (Chapter 3, §§3–6). Indeed, it is only because some oft-quoted claims from that famous section have been taken to imply Husserl's opposition to the reification of the hypothetical entities postulated by physical theory that §18 of *Ideas II* seems to raise an interpretative challenge.

In his analyses of §52 of *Ideas I*, Rang rightly stresses that the thesis of the identity of "the two things" directly contradicts the opposite claims made by critical realists such as Külpe, according to whom the things of perception are not the bearers ("Träger") of the laws of physics but signs that represent their in-principle unperceivable and really existing bearers.<sup>55</sup> The crucial issue is how to correctly spell out the consequences of this difference for the clarification of the task of physical theory. According to Rang, while critical realists take the things of perception to be auxiliary means ("Hilfsmittel") to determine the things of physics (which are pure "*Gedankendinge*"), Husserl, reversing the picture, takes the latter to be auxiliary means to determine the former.<sup>56</sup> Such an antirealist reading of Husserl's views on the hypothetical entities of physical theory hinges on the passages of §52 wherein Husserl claims that (1) it is wrong to think that concepts like "atoms" and "ions" refers to "*Dingrealitäten an sich*," that (2) their hypothetical status is completely different from

the usual positing of potentially observable entities such as an unknown planet, and that (3) it is wrong to causally connect the thing of perception and the thing of physics. Rang, too, reads these claims as implying that, according to Husserl, in-principle unperceivable entities *cannot exist* and that their role is similar to what he calls “metrical concepts” such as weight, mass, or temperature, the function of which is to determine the things of perception without making any claim about unobservable realities. The specificities of concepts such as atoms and ions, which Rang calls “substructive” (in a narrow sense of the term, I would argue), would lie in the fact that they are needed to determine causal processes occurring within the real perceivable things and events.<sup>57</sup> On this reading, I would argue, such concepts amount to a sort of “metrics of causation” of the perceivable world.

Much could be inquired of this antirealist position, which Rang does not equate to fully-fledged instrumentalism, at work to his mind only in the *Krisis*. This is because in *Ideas I*, as I interpret Rang’s reading, the theoretical posits of physical theory still exert a genuinely epistemic function and are not reduced to the rank of useful fictions; consequently, physics is not downgraded to a theoretical device yielding correct predictions only, as happens in the *Krisis* according to Rang. In particular, the boundaries between what Rang takes to be Husserl’s position in *Ideas I* and a thorough instrumentalism look to me very blurred. If atoms and ions do not (and *cannot* for principled reasons) exist, and if their function merely resides in partaking in the causal explanation of observable processes, then any other hypothetical entities serving the same explanatory purpose could replace them. Yet, this is exactly a typical instrumentalist argument based on the underdetermination of theory from empirical evidence.<sup>58</sup> Moreover, if, as Rang believes, Husserl’s position in *Ideas I* is akin to Mach’s, one cannot but remind the reader (see Chapter 1, §3) that, according to the latter, unobservable entities can only have a provisional, heuristic role in theory development, before physical theories are finally purged of any ontological mythology and expressed as mathematical relations between “metric” concepts only (in Mach’s own sense, i.e., between measurable quantities represented by variables in the expression of physical laws). No such eliminativism can be found in Husserl’s works.<sup>59</sup>

However, the real question is not whether Husserl became increasingly antirealist about unobservable entities in the time elapsed between *Ideas I* and the *Krisis* but whether he ever was antirealist. According to my interpretation, neither was he one nor could he ever have been. The aforementioned claims contained in §52, as we have seen, are laid down to prevent misunderstandings concerning the *sense* in which, say, an atom can be said to exist, i.e., its mode of constitution for transcendental consciousness. They do not concern any straightforward existence claims. This

fits Husserl's transcendental idealism according to which a position like critical realism is not wrongheaded for being realist but for being *realist in the wrong way*, or, as one could also say, for not being realist *enough*. Transcendental phenomenology must restore the intelligibility and transparency of all beings, and one has to understand in this way Husserl's often repeated claims that transcendental idealism, by turning reality into a constituted unity of sense, does not take anything away from reality. Positions such as critical realism, by contrast, tend to foster rather skeptical views about physical theory, such as that according to which we can only know the law-like relations existing among unknowable physical entities. Now, what is at stake in §52 of *Ideas I* is whether concepts like "atoms" and "ions" refer to entities that would exist in a radical "outside of consciousness" and that, consequently, would signal themselves in us only by causally evoking "perceptive signs" or "instinctive substructions" within the inner world of consciousness. This explains why the kind of reification operated by critical realists implies a correlative reification of consciousness. We witness here an example of the splitting of the world into two worlds, which, at bottom, is the problem of modernity, as Husserl will explain in the *Krisis*. The ontology of physical theory is projected into a mythical "*an sich*" of which "the ideas in the mind" are the subjective pendant: two worlds stand side by side, one inhabited by "*Dinglichkeiten an sich*" and the other by mental entities.

In sum, while it is true that concepts such as "atoms" and "ions" do not refer to "*Dinglichkeiten an sich*," this is not because atoms and ions do not exist, but because they exist *qua* endpoints of the constitution of material nature in transcendental consciousness. The dogmatic realist (such as the critical realist) believes that all being has a thing-like character: the things of perception are reduced to associative complexes of "ideas in the mind" while physical things are concrete entities that, in principle, God could perceive. But atoms, for Husserl, exist (if their existence is confirmed by empirical findings) in a different way; they exist as "translations" of the world of perception and sensation into theory. They make up the world that is given to us in perception as *sublimated* into theory. And they must be there for any knowing subject, as the passage from §18g of *Ideas II* quoted previously clearly stresses, no matter the contingent structure of its sense organs or its "cognitive architecture." This is why postulating planets and postulating electrons are two different, albeit equally legitimate, inferential activities, and why postulating an alleged trans-subjective causal chain, as critical realists do, amounts to sheer mythology. Once more, this is not to say that no causal (or, rather, conditional) account of perception is possible or needed, but that the entire chain of events going from "the true physical fact" to an *Erlebnis*, which it is the task of psychophysics to investigate, must itself be seen as sense-units constituted in consciousness, and cannot therefore amount

to a mythical bond between two absolutes that contingently entertain mutual relations (see Chapter 3, §5).<sup>60</sup> The sense of being of the object of psychophysics demands to be elucidated by another constitutive analysis focusing on the way in which, within transcendental consciousness, the sense “psychophysical conditionality” is constituted. Again, all components of such conditionality are sense-units announcing themselves as identities in manifolds of appearances.

In order to find further support for his position, Rang also refers to the opposition between real or sensuous objects on the one hand and ideal objects or states of affairs on the other that Husserl lays out in the *Logical Investigations*. A real object is defined as a possible object of a simple perception, that is, a sense perception, while ideal objects and states of affairs are possible objects of founded non-sensuous perceptions. Rang believes that this distinction already points to the idea that what is unperceivable in principle cannot have physical reality.<sup>61</sup> However, this cannot be the case. As we know, in the *Logical Investigations*, Husserl excluded from the scope of his investigation questions concerning the reality of the entities postulated by physics (see Chapter 2, §4). Thus, it is illegitimate to attribute such metaphysical significance to the distinction between real and ideal objects.

A similar point can be made concerning another important definition that is often overlooked in these discussions, namely, that of material nature. More than once, and, at any rate, right at the beginning of *Ideas II*, Husserl defines “nature” as the correlate of all possible experience. Should we take this definition to imply that what cannot be perceived in principle cannot exist and that an exhaustive description of material nature would need to stop at a description of all its observable qualities and states of affairs (as, by the way, Mach would readily grant)? This would amount to giving a metaphysical meaning to what Husserl intends only as a phenomenological characterization of a kind of constituted sense-unit, and, moreover, to turning metaphysical claims into deductive consequences of a mere *definition*. On what grounds, one should ask, could Husserl define nature as the totality of the objects of possible experience? Why can't atoms exist, too? The answer is crucial to understanding the difference between modern metaphysics and phenomenology: Husserl is not defining a substance like Descartes does, or an attribute of a substance like Spinoza; rather, he is giving a name to what a class of intentional acts “mean,” to an ontological region intended as the sum total of the possible correlates of certain originally giving intuitions.<sup>62</sup> That is physical or material nature, and it is fully rational to *attempt* to bring it to an ideally complete determination under the form of a mathematical manifold. Out of essential necessity, such a determination must be possible for material nature to be completely objectifiable,<sup>63</sup> since only mathematical determinations do away with the vagueness and



the subjectivity of the correlates of sensuous perception. This is the sense of the identity between the thing of perception and the thing of physics, and, more generally, between prescientific nature and the nature of natural science (see Chapter 3, §4). When we say that nature is the domain of all possible experience, we prejudge nothing about the possible existence of atoms and ions, or of any such putative entities. In this respect, and from this perspective, the continuity between *Ideas I* and *Ideas II* is readily discernible.

One last aspect of Rang's interpretation deserves to be discussed. Rang correctly points out that, in *Ideas I*, the motivation to posit the thing of physics lies in prediction and explanation, whereas, in *Ideas II*, Husserl insists on the demand of defining an invariant element through abnormal variations of one's perceptual states.<sup>64</sup> Nevertheless, I cannot follow him when he sees this as another sign of the influence of critical realism on Husserl. True, Husserl's exposition in the sections of *Ideas II* that directly address the constitution of the thing of physics does not explicitly state that the motivation for the mathematization of nature should be understood within the broader *telos* of predictive-explanatory sciences; nevertheless, by placing these constitutive analyses in the larger framework of his theory of science, one realizes that this is the case as much as it was in *Ideas I*. Let us recall that the first section of *Ideas II*, the title of which is "The Constitution of Material Nature," is intended to sketch the constitutive layers pertaining to physical nature *qua* object of the physical sciences. The theory of the constitution of physical nature, once fully developed and integrated into transcendental phenomenology, would *ipso facto* amount to the main chapter of the transcendental theory of the scientific cognition of nature. Therefore, what is ultimately in question is an analytics of systems of acts that correspond to an ideally complete cognition of nature and are carried out in the naturalistic attitude, which is but a specification of the theoretical attitude. Physical nature, as a correlate of the theoretical attitude, is from the outset the *telos* of scientific endeavor, and, technically, an objective pole that imparts a teleological structure to the subject's life. In §11 of *Ideas II*, Husserl had already characterized the teleological structure underlying the naturalistic attitude. Taking up the naturalistic attitude implies a sort of reduction that discloses nature as the sphere of mere things.<sup>65</sup> The subject suspends all "feeling-intentions" by virtue of which things appear endowed with value predicates of all sorts. However, as Husserl readily adds, that does not imply that the subject of the theoretical attitude in general, and that of the naturalistic attitude in particular, does not *value* at all.

*This subject does value the knowledge of appearing being and the determination of that being by means of logical judgements, theory, science. Thus it values the "It is so," the "How is it?" Furthermore,*

it does attach value to matters of practice, too; it is indeed interested in transformations, and this subject will produce them in practice by means of experiments. But it does not do so for their own sake but produces them only in order to make visible thereby the connections which might advance the knowledge of appearing being. The correlate of nature is thus not a subject that in no way strives, wills, or evaluates. That is unthinkable. Knowledge of nature abstracts only from all other values besides the *cognitive values*: "I want nothing other than to experience nature more richly by means of 'theoretical experience' and to know, in a theoretical knowledge on the basis of experience, just what that which appears is, what nature is."<sup>66</sup>

Thus, when Husserl describes how the anomalies of the ortho-aesthetic system motivate the positing of the thing of physics, he is presupposing that such motivation acts on a subject already teleologically oriented towards the theoretical determination of nature. Such determination, in turn, encompasses both explanation and prediction of physical events. Only if we are oriented from the outset towards the *telos* of the scientific determination of material nature, i.e., towards a true theory in which the true being of material nature is expressed, do perceived anomalies rationally motivate the mathematization of nature. What is at stake, once the theoretical attitude has been taken up, is which conceptual resources are demanded by the task of objectifying (= knowing) nature, in what language such a true theory must be contrived, and, on the side of the object, what the language of nature is. One must be motivated by the desire to arrive at unconditionally valid judgements about this world (i.e., in the language of the *Krisis*, judgements that are not subjective-relative) in order to realize that, first, no judgement of experience can by itself enjoy such universality, and, second, that the methods and language of the (mathematical) science of nature must be adopted.

This prompts a number of considerations that, once more, anticipate the grand theme of the *Krisis*, which, at bottom, consists in the interplay between the motivational structure of knowing subjectivity and the teleology of history. In the prescientific attitude, which Husserl will call, in the *Vienna Lecture*, the *practical attitude*, perceptual anomalies would never motivate the positing of the thing of physics because, according to the corresponding ruling apperception, things appear as tools and goals of a practical engagement with the world only (which includes also the religious, ethical, and political dimensions), and their identity is a problem only within the vague constraints that such engagement demands. This is particularly the case for all determinations that come in degrees:<sup>67</sup> no motivation for replacing all secondary qualities with objective physico-mathematical predicates can arise at this stage. This does not mean that the emergence of the theoretical attitude and of the idea of an *episteme*

that is ideally the same for all rational subjects is a sufficient condition for the mathematization of nature; it is only a necessary condition. If the theoretical attitude is the dominant attitude, the preconditions are set for Galileo's decisive step to be taken. In the Greek world, where the theoretical attitude first appeared,<sup>68</sup> the only mathematical science of nature was astronomy, but it was not conceived as part of cosmology, i.e., it did not aim to unveil the inner nature of celestial phenomena. Until the modern era, for reasons that cannot be mentioned *en passant*, the task of theoretically determining physical nature had not *de facto* acted as motivation to posit the thing of physics, as indicated by the predominance of Aristotelian physics, which attributes objective existence to qualities such as heat, cold, humidity, and dryness, as well as to colors. We have in all such non-mathematized physics (up to the anti-Aristotelian Renaissance work *De Rerum Naturae Iuxta Propria Principia* by Bernardino Telesio) attempts to develop an *episteme* of nature that considers *qualities to be ultimate realities* which rest content with a notion of objectivity that qualities can support. In the *Krisis*, Husserl argues that only with the new dominant idea of a universal science does the subjective-relative character of perception trigger (in the mind of Galileo and of many others) the idea that it was possible to substruct all essential components of the perceptively intuitive nature with mathematical essences and turn nature into a mathematical manifold. This, in turn, motivated the quest for a (in Husserl's view, misguided) *metaphysical* underpinning of the new physics' methodology, with which modern philosophy busied itself for generations. At the time of *Ideas II*, many of these considerations were no doubt still on their way; yet, the constitutive analyses contained therein are fully in line with the development that began well before the *Logical Investigations* and culminate in the *Krisis* and do not make any concession to the standpoint of critical realism.<sup>69</sup>

## §6. The Problem of the Transcendental Status of Husserl's Constitutive Analysis in *Ideas II*: A Response to Ingarden's Critiques

As we have seen (see Chapter 3, §7), Husserl's account of the scientific knowledge of nature has been the subject of philosophical critique and scholarly work on the basis of a conceptual framework originating outside the phenomenological tradition, and more specifically in the English-language philosophy of science. They have been criticized to a lesser extent by Husserl's own disciples and followers. There is no doubt that Heidegger kept in mind Husserl's phenomenology of natural science while developing his own radically different reflection in *Die Frage nach dem Ding*,<sup>70</sup> and Merleau-Ponty and Jan Patočka have carefully read these texts and, sometimes, briefly commented on them.<sup>71</sup> However,

unsurprisingly, given their general outlook, none of these authors have engaged these analyses in a direct and detailed way, trying to understand to what extent they could provide a line of inquiry worth pursuing. This situation reflects the general tone of post-war phenomenology, which either set out to radically reform the very idea of phenomenology, in view of superseding Husserl's transcendental approach, or else relapsed into a purely exegetical approach of Husserl's writings. Furthermore, the widespread lack of interest towards the theory of science that has been predominant within continental circles until not so many years ago has also reduced the number of the exegetical studies to but a handful.<sup>72</sup>

An exception to this general trend is represented by a long essay written by Roman Ingarden for a conference that took place in Fribourg in September 1963 around the theme of "phenomenology and the natural science" entitled *Husserls Betrachtungen zur Konstitution des Physikalischen Dinges*. It is no coincidence that the great critic of Husserl's transcendental idealism felt the need to put Husserl's ideas on what modern philosophy has so often identified with the "in itself" *par excellence*, i.e., with nature as determined by theoretical physics, to the test. In this section, I will discuss Ingarden's most important critiques of Husserl's position, which, in spite of his reservations, he, too, sees as rather stable from *Ideas I* up to the *Krisis*.<sup>73</sup> Responding to Ingarden's critique will allow for a deeper understanding of the method of Husserl's constitutive analyses.

One should begin by noticing that Ingarden's explicit task is to explain and scrutinize Husserl's conception of physics in view of a confrontation with the massive literature produced by logical positivism and its heirs, which he places under the heading of the "so-called philosophy of science,"<sup>74</sup> an expression he uses in English.<sup>75</sup> This is a historically interesting particular that could prompt a long discussion by itself. We are by now so accustomed to the idea that philosophy of science is a canonical subdivision of philosophy that we tend to forget how recent its establishment and institutionalization is. The term itself does not have a very long history, and its fortune outside the English-speaking world is mainly due to the influence of Anglo-American philosophy.<sup>76</sup> By using the English expression, Ingarden conveys the sense of a novel field of study that, within Central European philosophy, is associated to the Anglo-Saxon post-war cultural climate. This choice foreshadows the opposition between the classical German tradition of *Wissenschaftslehre*, in which Husserl's phenomenology was so firmly rooted, and the new forms of philosophical reflections on science that were to play such a prominent role in what we now call analytic philosophy.

We know that the reference of the *Aestheta* to the aesthetic *Leib* constituted the fundamental step towards the idealization of nature and its transformation into a purely categorial objectivity. Now, Ingarden, in two different places of his essay, expresses serious methodological qualms

about the compatibility of the analyses developed in *Ideas II* with Husserl's own method of transcendental phenomenology.<sup>77</sup> Actually, he too claims that Husserl seems to adopt the point of view of critical realism that he had so vehemently criticized.<sup>78</sup> The problem is how to provide a clear account of the transition from the thing of perception to the thing of physics. In order to do so, critical realism accepts the existence of our body, its participation in the causal nexus of the world, and the existence of causal relations between external stimuli and sensations. As Ingarden rightly stresses, it is to avoid the circularity implied by these presuppositions that Husserl devised a method based on the suspension of the world along with the subject's *Leib*.<sup>79</sup> From the immanent data of the internal time consciousness to nature as described by physical theory, the theory of constitution must never trespass the limits set by this method. Ingarden, while being optimistic about the in-principle possibility of a coherent theory of transcendental constitution, believes that Husserl has failed to develop a convincing version of it, and suggests that this failure might explain the decision not to publish the existing parts of *Ideas II*.<sup>80</sup> Ingarden takes issue with the fact that, after accounting for the constitution of the thing of perception by means of the perceptual syntheses motivated by ordered series of kinesthetic data, Husserl speaks of the relativity of the perceivable qualities of things in terms of psychophysical conditionality and somatological causality.

But this is what is remarkable, that this relativity is clearly interpreted in the sense of a *psychophysical* "conditionality" – as Husserl expresses himself! – a "conditionality," in which it is not only a question of a *causal relation* between the things endowed with sensuous qualities and the *Leib*, but one also speaks of a *dependence* of the sensuous qualities intuitively assigned to the thing on the *conformation and the state of the perceiver's Leib*.<sup>81</sup>

According to Ingarden, this implies a reference . . .

. . . to the fact that the *Leib* belongs to the world, as well as eventually also to the fact that the entire world consists of a system of causal relations, so that also the perceiver's *Leib* belongs to this system. The sensations, whose occurrence plays such an important role in the appearance of the sensuous qualities of things, are dependent on the processes in the *Leib*, and the *Leib* is, moreover, causally dependent on its real environment. In this way, first the existence and the conformation of the *Leib* – as a something in the context of which both the "internal" and the "external" sensations take place – is presupposed (assumed), further, the *Leib* is conceived as a member of the real world, so that, eventually, a causal chain between the

thing of physics and the thing of the concrete perception is asserted, thus, something that Husserl, in *Ideas I*, has vehemently opposed.<sup>82</sup>

These assumptions, Ingarden concludes, transgress the transcendental reduction because they require the presupposition of the *validity* of sensory perception.<sup>83</sup> Husserl would, thus, rely on the actual existence of the correlates of perception. To summarize, according to Ingarden, in §18 of *Ideas II* Husserl presupposes: (1) the real existence of the *Leib* as an element of the world (or, better, of nature) along with the physical and physiological processes taking place in it and between it and the surrounding objects; (2) via the conditionality between the *Leib* and the “internal” sensations, a dependence of the perceived qualities of things on the causal events taking place in and outside of the *Leib*, and, what is worse, (3) the presence of a causal relation between the things of perceptions and the things of physics.

According to Ingarden, since these three assumptions determine a relapse into the natural attitude, they are incompatible with Husserl’s own transcendental method. The problem lies in the role that conditionality and causality play in the transition from the thing of perception to the thing of physics, which, to Ingarden’s eyes, seems to infringe on the immanent, descriptive method of phenomenology. After all, it is one thing to describe the constitution of a transcendent object of perception by virtue of the coordination between perceptual syntheses and kinesthetic data; it is quite another to justify the theoretical positing of the thing of physics by invoking a factually existing chain of causal/conditional interactions involving stimuli produced by external causes, their effects on the sense organs, the emergence of sensations as a result of such effects, and, finally, the appearance of the thing of perception. In the second case, while we do not necessarily endorse Helmholtz’s naturalistic method and his suspicions against immanent psychological reports, at least we do seem, quite literally, to be “placing the epistemological subject in the laboratory,”<sup>84</sup> just as Helmholtz required. At the very least, we accept that the perceiver is involved in objective causal processes, which one could also investigate in a systematic way in a laboratory.

Now, in order to take up Ingarden’s challenge, one has to begin with what Husserl says much later in the text of *Ideas II*, in §49, viz., that the analyses concerning the constitution of material and psychophysical nature were carried out in the *naturalistic attitude*.

We link our considerations to what has been established in carrying out the pure phenomenological analyses of the preceding sections. In those sections our investigations were related to the naturalistic attitude. It was in that attitude that we carried out our analyses. It is easy to understand, however, that all the investigations will assume

the character of pure phenomenology simply by our performing, in the appropriate way, the phenomenological reductions. As long as we live in the naturalistic attitude, it itself is not given in our field of research; what is grasped there is only what is experienced in it, what is thought in it, etc. But if we carry out phenomenological reflection and the phenomenological reduction, make the attitude itself thematic, relate to it what is investigated in it, and lastly carry out an eidetic reduction and purification of all transcending apperceptions, then all our investigations are transformed into purely phenomenological ones. As subject of the naturalistic attitude we have then the pure Ego . . . For the rest, all that has been “put out of play” remains for us, here as elsewhere, preserved in the bracketing-modification: i.e., the whole world of the naturalistic attitude, “nature” in the broadest sense of the term.<sup>85</sup>

The “sections” in question are the first two of *Ideas II*.<sup>86</sup> Husserl begins by referring to the “pure phenomenological” analyses contained therein and to the fact that they lack something that would have made them, properly speaking, a chapter of pure phenomenology. The problem is that those analyses were carried out in the naturalistic attitude. What does this mean? The correlate of the naturalistic attitude is *nature*, and, if we conduct investigations in that attitude, then we are doing *natural science*. To what kind of natural science could such analyses belong? The only possible answer seems to be *psychology*. The first two sections of *Ideas II* would thus consist of a preliminary psychological investigation into the way in which real embodied subjects experience material and animal nature. This, however, requires three qualifications. First, it is undeniable that most analyses are already carried out at the eidetic level: the role of kinesthetic data in perception, the difference between phantom and thing, and the characterization of causal properties in terms of correlations of states are examples of this kind. Thus, in those cases, the analyses belong to *eidetic psychology*. This is not surprising. After all, also in *Ideas I*, eidetic psychology was a preliminary step to transcendental phenomenology, and, as is well known, Husserl insisted that one can switch from one science to the other “by a simple change of sign.” Second, Husserl is certainly relying on eidetic cognition of the essence of material and animal nature – for instance, when he describes the eidetic components of material things, the founded character of animal nature on material nature, the difference between causality and conditionality, etc. This is inevitable insofar as the different eidetic components of material and animal nature must supply *the themes* for the eidetic psychological analyses of the corresponding experiences.<sup>87</sup> This type of eidetic cognition belongs to the a priori ontology of nature, which is, as we know, the a priori part of natural science. Since eidetic psychology also

forms a part of the a priori ontology of nature, one would be tempted to conclude that the latter is the all-encompassing scientific discipline here in question. However, this is not the case, and this is the third qualification, because these investigations also contain psychological and, more specifically, psychophysical considerations that are overtly empirical. This holds true particularly of §18, where the transition from the thing of perception to the thing of physics is in question. There, Husserl not only assumes the existence of the *Leib* and of the surrounding things, he also mentions the four groups of *empirical facts* pertaining to physical causality and psychophysical conditionality I mentioned in Chapter 4, §2. As we know, in §18g, he also uses an argument *à la* Helmholtz about the correlation between quantitatively varying external stimuli that determine completely different perceptual qualities.<sup>88</sup> These empirical facts presuppose not only the general positing of the world but also the contingent structure of our bodies, sense organs, and surrounding environment, as well as the likewise contingent causal interweavings among them. In conclusion, the first two sections of *Ideas II* contain complex preliminary investigations in which the eidetic psychology *guided* by the ontology of nature is, in some cases, supplemented by empirical psychological and psychophysical descriptions involving the notion of causality and conditionality.

Doubtlessly, points one and two of the reconstruction of Ingarden's reading presented earlier are correct. Husserl's analyses do presuppose the naturalist and, a fortiori, the natural attitude and, thus, the validity of perception. The problem, then, is only whether Husserl is right in claiming that the results of his preliminary "naturalistic" investigations can "assume the character of pure phenomenology." I will argue that they can, and that neither the reference to the existence of the *Leib* and to psychophysical empirical facts nor the recourse to causality and conditionality raise any particular difficulty for the transition to the transcendental level. I will also argue that point three of Ingarden's reading is hopelessly wrong.

Pure or transcendental phenomenology of nature is the discipline investigating the *eidōs* of the correlation between transcendental consciousness and any *possible nature whatever*, or, equivalently, the eidetic science of the transcendental phenomenon *a nature in general*.<sup>89</sup> Consequently, what is true, and, more specifically, what is contingently true in the nature that factually exists is not something laying outside its scope.<sup>90</sup> Let us accept the existence of the factual nature that we have before our eyes, *the total domain of possible experience*, and let us consider it as an object of theoretical interest in the naturalistic attitude. This nature, as we know, is a psychophysical unity. In it, we find not only merely material things and processes, but also living bodies (*Leiber*) supporting psychological and aesthesiological properties. In particular, we find



ourselves as human beings. Empirical scientific research indicates that our sensations, and thus the way in which things appear to us, are conditioned by events belonging to the causal nexus linking our bodies with the external environment. To focus but on two of the aforementioned examples, it appears that the ingestion of santonin modifies color perception, and that stimuli that change only quantitatively produce qualitatively different perceptions. These empirical findings may well require placing the epistemological subject in the laboratory. To put it rather vividly, we could name the subject of the naturalistic attitude conducting these investigations *I-Helmholtz* and conduct this investigation in the first person. *I-Helmholtz*, in this *de facto* existing nature, discover the relativity of the *Aestheta* to the aesthetic *Leib*. The conclusion is that the experienced things are not “in themselves” the way they appear to me. This provides me with the motivation for going beyond nature as it is given in perception and for attempting to characterize *its material stratum* as a mathematical manifold along the lines reconstructed earlier. Let us stress that *I-Helmholtz* take this theoretical step by discovering aesthesiological and psychophysical facts about real embodied subjects considered in relation to their likewise real external environment: *the facts in perceptions (Die Tatsachen in der Wahrnehmung)* that *I-Helmholtz* discover belongs to this nature. In other words, this nature, this domain of all possible experience, of which *I-Helmholtz* am a member, contains empirical facts that motivate setting the goal of the mathematization of its material stratum.

If now *I-Helmholtz* perform the transcendental reduction, this existing nature is bracketed and becomes a pure or transcendental phenomenon. The naturalistic attitude, which “becomes thematic,” as Husserl says, reveals itself as a possibility of my pure ego’s life, the “ultimate subject.” As for the phenomenon “this nature,” nothing changes vis-à-vis its sense and internal articulation. For me, now, it counts only as a phenomenal correlate of my transcendental life. Yet, the validity of all the facts that obtain in it is still part of this phenomenon. This nature, this domain of possible experience, this abstraction made of all value predicates, is the one in which *I-Helmholtz* exist as a human being among other human beings and animals. As a human being, I have a *Leib*, with its aesthesiological stratum and all the causal interweavings with the surrounding objects. Except that now I recognize that *I-Helmholtz* am the self-objectivation of my transcendental Ego. It still appears to me to be the case that, as a natural scientist, I have discovered empirical facts, which motivate the transition to the language of theoretical physics: *this nature-phenomenon is such that it contains empirical facts motivating the method of mathematization.*

I now perform the eidetic reduction, and I work out, correlatively, the invariant structural components of any possible nature-phenomenon and the corresponding invariant types of constituting intentional acts belonging to the subject of the naturalistic attitude. The factually given

nature-phenomenon counts now just as an instantiation of its *eidos*, or, equivalently, as an instantiation of the phenomenon “a nature in general.” To be sure, to any possible nature-phenomenon belongs a spatiotemporal form and, within it, experienceable things and their causal properties. Of course, the causal style itself may vary. Further, any possible nature-phenomenon, as correlate of the naturalistic attitude, contains the self-objectivation of the transcendental Ego in the form of a “human being” capable of experiencing and cognizing nature. But “human,” here, means *animal rationale*, not *homo sapiens*: I leave behind the actual form of my embodiment, and, a fortiori, my personal identity as this natural scientist. Yet, a *Leib* belongs to me in all conceivable situations, and, for this reason, at least, psychophysical beings belong in any nature-phenomenon. The eidetic components of this transcendent “human being” comprise (among other things that we can leave out of consideration) a stream of perceptual *Erlebnisse* together with the relevant series of kinesthetic data, a *Leib* with its physical corporeality and support for localized kinesthetic data as well as sensations belonging to the different sensory fields. Furthermore, there belong the psychophysical conditionality between perceptual *Erlebnisse* and events taking place in the *Leib* (and, in particular, in the sense organs) and the proper causality connecting the *Leib* with the external environment. Santonin may not exist, or it may not affect our color perception at all. Sight itself may not exist. Likewise, it may be the case that quantitatively different stimuli do not arouse qualitatively different sensations. Yet, and this is the crucial point, if the specific type of psychophysical conditionality is contingent, its presence is not. As we have remarked, there must be a *normal* correlation between bodily events and sensations for a stable reality to appear.<sup>91</sup> Likewise, the material stratum of the *Leib*, being itself a thing, is necessarily in a causal connection with the environment. Any possible psychophysical (and, thus, aesthesiological) transcendent unit is so constituted that it admits of the existence of psychophysical conditionality and somatological causality as well as of their interplay.

But this is tantamount to saying that any nature-phenomenon contains “facts in perceptions,” allowing the reference of the *Aestheta* to the aesthetic *Leib* and at least motivating the attempt to mathematize its material stratum. Some abnormal states of the sense organs or other parts of the *Leib* must be possible that modify the appearances of things. As Husserl notes, we may indeed conceive of a possible nature in which, *de facto*, the dependence of the appearances of things from the state of the *Leib* does not spontaneously manifest itself. Yet, in such a case, one could use surgery to make it evident.<sup>92</sup> For this dependence must exist, given that the fields of sensations are connected to the sense organs.

These considerations, I believe, show that the transcendental conversion of the facts mentioned in points one and two earlier is possible and that Ingarden’s challenge can be met. This analysis also highlights

that the transition from the thing of perception to the thing of physics requires, *by essence*, not only the constitution of animal nature, but also considerations pertaining to psychology and physiology. This is unsurprising, given that several classical arguments establishing the distinction between primary and secondary properties concern the relation between perception and the embodied subject.<sup>93</sup> In an appendix to *Ideas II*, Husserl explicitly affirms it:

Physics requires, therefore, aesthesiological physiology and psychology: since, for example, color as secondary thing-quality depends on the organization of the eye . . . , color is then eliminated as non-physicalistic and is taken as mere manifestation of an Objective quality, as manifestation of the physicalistic correlate of color.<sup>94</sup>

As for point three, however, it is not difficult to realize that Ingarden is wrong. Husserl does not postulate any causal link between the thing of perception and the thing of physics because, as we know, they are not two distinct realities existing side by side, but two constitutive layers of the same object. The origin of this mistake resides, once more, in the failure to acknowledge that transcendental phenomenology, as anticipated (see Chapter 3, §5), is perfectly capable of making room for a psychophysical causal/conditional account of perception. Let us imagine that, in a laboratory, we are trying to develop such an account by observing how a subject's perception of external things depends on a number of environmental and somatological variables. The following three levels must be distinguished: (i) the thing of perception that is used to test the subject's responses (as is often the case, it could amount to a screen on which different colors are projected); (ii) the physicalistic description of (i), i.e., "the thing of physics"; and (iii) the thing of perception *as it appears to the subject*. Ingarden's problem is that he conflates (i) and (iii). When we are conducting investigations of this kind, we are not interested in the thing of perception as natural objectivity, but in its appearance for a given subject. What discloses the field of the experimental, psychophysical account of perception is an apperception by virtue of which the correlates of the subject's experiences are annexed to its psychological life. They are not apperceived as material-natural, but as psychological objectivities. There is a straightforward way to persuade ourselves that this is the case. If, by tinkering with its eyes or brain, we induce abnormal perceptions in the subject, we would never think that the "thing of perception" used to test the subject *is really changing*. The latter remains what it is regardless of the way it appears to the experiment's subject, because it is an object constituted by a community of normal subjects. And it is *in* that unchanged thing of perception that the likewise unchanged thing of physics announces itself. Indeed, it belongs

to the essence of such investigation to know in advance the conditions of the experimental setting.<sup>95</sup> In conclusion, Husserl does not relapse in the error of critical realists. Actually, this example further clarifies the source of their error. If the Helmholtzian *facts in perception* can be integrated in the transcendental theory of the knowledge of nature, Helmholtz and the critical realists must be rescued from their erroneous epistemological interpretation of their own results. The experimental study of perception presupposes that nature is already constituted as a transcendent being and that we, as embodied subjects, are a part of it. Within this constituted nature, there is no “hidden cause” of perception that physics would try to determine, but only a known perceived thing determined by a likewise known (and tentatively true) thing of physics. The transition between the former and the latter occurs *within* the already constituted psychophysical nature and thus presupposes the ultimate reference to constituting subjectivity.

These considerations also illustrate the nature of the relation between transcendental phenomenology and empirical/experimental knowledge. The former never presupposes the latter, but that does not mean that it must ignore it. Empirical findings count as *possibilities*, better as possible correlates of transcendental consciousness, and phenomenology is interested in the essence of the appurtenant correlations. For this reason, it does not matter at all whether the results of Helmholtz’s experiments are valid; all that matters is whether they can be valid in a possible nature. As is well known, the eidetic reduction can take as its point of departure a fact given in perception or an imagined (and thus *neutralized*) fact.

Finally, let us stress that Husserl has not tried to show that it belongs to the *eidos* of material nature to be, in itself, a mathematical manifold. While its spatiotemporal form is a priori mathematizable, that all its eidetic components can be fully mathematized is not a claim grounded in the a priori ontology of nature. What Husserl has shown is that it belongs to any possible nature to admit internal horizons of determination which motivate the attempted mathematization of its material stratum. Whether this can be carried out at any level of exactness remains a *sui generis* hypothesis. This fact was already highlighted by the first step of the world annihilation, in which Husserl imagines a world of perception that does not admit *at all* any exact determination after the style of mathematical physics. As we shall see, in the *Krisis*, this will appear to be *Galileo’s hypothesis* (see Chapter 5, §6).

The discussion of Ingarden’s critique has allowed us to gain a better grasp on the way in which the analyses contained in *Ideas II* lead to the elucidation of the being of nature promised by transcendental phenomenology. The next section will complete the long movement initiated in Chapter 1 and connect back to the theme of the relation between science of nature and metaphysics.

## §7. Transcendental Phenomenology and the Debate on the Relation Between Science of Nature and Metaphysics

What more or less explicitly underlies the different positions reconstructed in Chapter 1 is a certain account of the nature of knowledge, of the “cognitive bond” between subjectivity and the world. Such an account of knowledge determines a philosophical “interpretation” of the being of the world, which, in turn, assigns to physical theory a specific task and method. Conversely, in each case, the resulting conception of physical theory *reveals* how the relation between subjectivity and the world is understood. As we have already noticed, one should not forget that, no matter their degree of scientific sophistication, these positions remain within the compass of the philosophical alternatives bequeathed to us by modernity from Descartes to Kant. Transcendental phenomenology aims to overcome such positions, not by providing yet another “interpretation” of the being of world, but by elucidating *its sense* according to an intuitive method. By removing such interpretations, transcendental phenomenology undercuts also more recent epistemologies developed at the end of the 19th century as well as their progeny.

The point of departure in Chapter 1 was provided by the doubts raised by Du Bois-Reymond about the metaphysical value of the mechanistic worldview. A radical solution to Du Bois-Reymond’s unsettling *ignora-bimus* was Mach’s position, which aimed to free science from any “metaphysical mythology” and, consequently, to deny the existence of any alleged limitation to our knowledge. Such a point of view, firmly rooted in the tradition of Hume’s empiricism, could not be in any way satisfactory for Husserl, and it is surprising that some interpreters have failed to acknowledge this fact. As is well known, Mach’s account of perception is totally unacceptable in light of Husserl’s theory of intentionality, which in turn provides the basis for his conception of knowledge. Mach, just as any phenomenalist, fails to acknowledge the distinction between the immanent data of experience and the objective properties belonging to the experienced object.<sup>96</sup> In the language of the *Ideas*, the former are the hyletic data, which, animated by the noeses, give rise to the objective properties that are the correlates of perception. By reducing the thing of perception to an associative complex of sensations, Mach misses the intentional character of consciousness. Only by virtue of this confusion could he claim that physical bodies are convenient signs or symbols for complexes of sensations and that “the world consists of colors, sounds, temperatures, pressures, spaces, times, and so forth.” This mistake determines, in turn, his conception of the task and method of physical theory. If the things of perception are just fictions that, no matter how instinctively, we devise in order to summarize a large amount of experiences, if they exist “only in thought,” the task of the theoretical determination of

such things becomes meaningless. There are no true intrinsic properties of such things. Consequently, physical theory cannot but continue in a systematic way the economic function already at work in our prescientific life, i.e., summarizing and connecting sensations in a systematic way.

According to Husserl, sensations are not signs or symbols of things, either; rather, they are apprehended in such a way that an object can be adumbrated, an identical pole can announce itself in consciousness, without being an immanent component of it. Consciousness is no longer a complex of immanent elements, but a structure of directedness stretched between the opposite poles of the pure ego and the intentional object. One can thus appreciate that, whereas Mach sees the relation between actual and potential perception in terms of a lawful connection of sensations, Husserl identifies in the notion of horizon the essential feature of transcendent perception. The being of the thing perceived is thus constituted in the constant progress of experience. But, if the qualities of the perceived thing reveal a regulated dependency on the perceiver's *Leib*, then the way is open for setting the goal of its theoretical determination after the manner of mathematical physics, to which, accordingly, the task of knowing the intrinsic properties of "physical bodies" is assigned. Finally, as intended sense, as constituted unit of sense, the perceived thing as well as its theoretical determinations, while not existing "only in thought," are in no way beyond consciousness: *consciousness has no outside*.

While Mach's phenomenalism, as much as the radical empiricist philosophy it derives from, ends up in the denial of the transcendence of the world, and in its reduction to psychological immanence, critical realism (and metaphysical realism more generally) misunderstands the sense of transcendence in an objectivistic way. In this chapter as well as in the previous chapter, I have explained in detail in what way, according to Husserl, this perspective rests on the failure to grasp the sense of the transcendence of the world (of its "externality," so to speak) and the absurd views about the task of physical theory that follow. Here, I would like to draw some conclusions concerning the different resulting articulation between natural science and metaphysics. In order to do so, let us first recall Husserl's early distinctions between different meanings of the term "space" (see Chapter 2, §1), viz. between (1) the space of prescientific life, (2) the space of pure geometry, (3) the space of the science of nature (or space of applied geometry), and, finally, (4) the transcendent metaphysical space, i.e., true space as it is in itself. We can now appreciate how transcendental phenomenology clarifies the relation between these different levels of spatiality. The space of prescientific life is the one in which the things of perception are situated. In this chapter, it appeared as an objective system of location that is not directly given to the senses, yet intuited on the basis of changes of location and acts of empathy. The identification of this space with the space of geometry yields the space of natural science. In virtue of this identification, the space of prescientific

perception does not *become* the space of pure geometry nor does it disappear to give way to it; rather, the true spatial form of the world is defined as a Euclidean three-dimensional manifold that can manifest itself to us only *through* the space of perceptual intuition. This is the sense of its higher order transcendence, which grounds the possibility of identifying the things of perception with theoretical counterparts situated in the space of natural science. Once the theory of constitution has accounted for this identification and removed any possibility of considering the space of natural science as a symbolic representative of a space existing in itself and lying beyond the reach of our knowledge, once the transcendence of the space of natural science is elucidated, then such space can also be called *metaphysical*, according to Husserl's definition of metaphysics as the ultimate science of reality. Similar considerations can be repeated concerning time and, thus, the entire spatiotemporal form in which each natural reality is situated.

Now, if we compare this result with the critical realists' tenet that there are three "worlds," the world of perception, the world of physics, and the real (metaphysical) world, we understand why, according to Husserl, there is, instead, only one world comprising two different constitutive strata. Once we realize that the true world in itself of the critical realists is an absurd metaphysical substraction, and once we realize that the world of physics is the objectivation of the world of perception, and once constitutional analyses have clarified the sense of this identification, the world of physics acquires also the *metaphysical sense* of the true world in itself. To be sure, this does not mean that the system of our *current* scientific theories is true. Rather, if this system is not affected by any internal incoherence, it corresponds to a possible true world in itself. The true world is described by one such possible system of theories, and it is in no way an unreachable in-itself that resides on a different ontological level. The true world becomes an idea in the Kantian sense lying at the endpoint of an infinite progress of theoretical determination. The task of physics is the endless *horizontal objectivation*, so to speak, of the world of perception, rather than the hopeless attempt to bridge the gap between subjectivity and an absurdly absolutized world in itself. Consequently, the claim of some critical realists that we can *in principle* access only the structural structure of nature (see Chapter 1, §4) and not its ultimate constituents also becomes meaningless.

Let us recall how, in Chapter 1, Du Bois-Reymond's account of the limits of natural-scientific knowledge and of its total lack of metaphysical value prompted a vast debate in the scientific and philosophical circles of the time. It is now time to ask ourselves whether transcendental phenomenology has the resources to meet Du Bois-Reymond's challenge. This is of course not something that, to my knowledge, Husserl has discussed anywhere, not even in a sketchy way that would indicate how a response should be given. However, a phenomenological solution to the riddle of

the essence of matter is required to further clarify the sense of the phenomenological transformation of the sciences of facts into metaphysics.

Let us go back to why Du Bois-Reymond believed that we are unable to build a satisfactory notion of the *philosophical atom*, i.e., one that, in contrast with the physical atom, is not just a useful methodological device, but also a metaphysical entity explaining the properties of matter. This argument, as I understand it, runs as follows. Du Bois-Reymond's fundamental premise is that we are unable "to represent anything other than something experienced either with the external senses or with the internal sense." In the quest for the fundamental components of the physical world, we start from matter as we perceive or imagine it, and we set out to divide it further and further. Two alternatives are open to us: if we simply halt the division at a certain point, we still have a chunk of matter that has the same properties as the one with which we started. Thus, no step has been taken towards the determination of the essence of matter: we obtain a physical atom that can at best help us to mentally decompose large objects in a convenient way. The other alternative is that we do not limit ourselves to halting the division, but, in virtue of a *coup-de-force*, we attribute to the small part of matter just obtained completely new properties that are not experienced with either the external or the internal senses. However, by virtue of Du Bois-Reymond's premise, we obtain something that we are unable to represent, which leads to the classical contradiction of corpuscular philosophy. In other words, concepts such as "pointlike particle having a mass and a charge" or "extremely small and yet extended particles that are indivisible and infinitely rigid" are chimeras created by attributing to material entities properties that we do not experience (and, presumably, cannot experience).

Let us now set aside the problem, already mentioned in Chapter 1, that this argument assumes that physical explanation must necessarily be mechanistic. This is a factual problem that does not concern us here. The objection that can be raised from a phenomenological point of view is that Du Bois-Reymond's fundamental premise is wrong. We are indeed able to represent something that we cannot experience with either the external senses or the internal sense, viz., *idealizations*. The difference between perception and idealization is completely absent in Du Bois-Reymond's argument. The intrinsic determination of material objects is not reached by "halting the division at a certain point" and eventually postulating some mysterious properties, but by replacing such objects with ideal entities endowed with mathematical properties only, which fill a likewise ideal space. We obtain, in this way, a theoretical determination of what we experience that is different in character from *what* we experience. This distinction between perception and idealization, Husserl's own reinterpretation of Descartes' distinction between nature as object of *imagination* and nature as object of *intellection*, is such that the latter "is not, strictly speaking, describable, and no concepts of



immediate experience can go to determine it.”<sup>97</sup> It is thus pointless to worry about the limitation that experience and imagination set to our ability to represent an object. The internal coherence of such hypothetical inner nature of physical objects is, of course, not guaranteed a priori, nor is its intelligibility (as today’s philosophers of physics know all too well), but it will depend on the internal features of the relevant mathematical structures, not on whether we can make sense of it by means of perception and imagination.<sup>98</sup> Perhaps pointlike particles or indivisible extended chunks of matter do not make physical sense, but this cannot be decided based on the power of our imagination. And if they do not make sense, then perhaps a space-time filled by different types of fields the *quanta* of which are elementary particles does, and this will provide a characterization of the inner properties of matter awaiting experimental confirmation. Indeed, among the coherent theoretical accounts, experimental results must (at least in principle) single out the best account, because such a characterization of the internal nature of matter is not an a priori, philosophical theory. I doubt that Du Bois-Reymond could ever prove that every physical theory must necessarily be incoherent if regarded as a tentative characterization of the inner structure of the material world.

Let us finally notice that these considerations show how Husserl’s account of the theoretical determination of nature does not require any metaphysical concept of matter. *Materiality*, as eidetic components of things, admits of a phenomenological analysis, but not matter as a *substance* of which physical objects would be made. Physics does not need the concept of matter: idealizations are not made out of matter, nor do they stand for anything “material” laying beyond them.

From the standpoint of phenomenology, there are thus no limits to the knowledge of nature, this being a consequence of the fact that nature is only a unit of sense constituted in perception and determined by idealizations. However, one could still question the phenomenological conception of metaphysics as the ultimate science of reality in a different way, from the inside, so to speak. If the theoretical determination of nature is possible by virtue of the manifestation of the objectively true nature “behind” the nature accessible to the senses, as Husserl sometimes says, why couldn’t one imagine that nature as determined by physics admits of a further layer of theoretical determination, yet of a different kind? Could physical nature, then, be just an appearance of another being that appears *through* it, and that would require another level of constitution? If this were the case, a science of nature, even elucidated by phenomenology, would not deserve to be called metaphysics, for it would not be an *ultimate* science of reality. However, this highly speculative possibility can be ruled out. In order to understand why, it suffices to recall that nature as it appears to the senses has to be determined by physical theory because it reveals its relativity to the *Leib*. The idealizations of such sciences, on the

other hand, cannot in principle manifest any relativity to any contingent feature of the knowing subject because they are mathematical in character. As such, they enjoy a pure objectivity, which cannot be relativized to the contingent normality of a community of knowing subjects. To be sure, intellectual normality is required by the constitution of mathematical objectivity, as of any other objectivity,<sup>99</sup> but such normality is not relative to the contingent features of the knowing subject. Rather, it defines the universal community of all rational subjects. A denial of this would imply a relapse into the kind of psychologistic interpretation of logic and mathematics that Husserl had criticized in the *Prolegomena*. Thus, the ultimate objectivity of the science of nature rests on the ideal, pure objectivity of mathematics and of logic. In conclusion, there cannot be any rational motivation to relativize the being of physical nature and to sub-struct another being that would be transcendent with respect to it.

This last consideration, I believe, contributes to clarify what Husserl meant at the end of the already quoted passage of *First Philosophy*: “the universe of the world, the universal theme of the positive sciences, acquires a ‘metaphysical’ interpretation, which means nothing other than an interpretation behind which it would make no scientific sense to seek another.”

## §8. Transcendental Phenomenology and the Challenge of the “New Physics”

The years between the publication of the *Logical Investigations* and Husserl’s death are marked by the rise of the two theories that have superseded classical physics, i.e., quantum mechanics and the theory of relativity. It is well known that, while Husserl was aware of these developments, which he mentions more than once in his work, he never discussed their epistemological implications in detail. This is a remarkable difference between Husserl and other philosophers of the time, such as Cassirer, Bergson, and Whitehead, not to mention the members of the Vienna Circle. It is, of course, not my aim to fill this lacuna. This would require a completely different theoretical effort from the one I have attempted in this book.<sup>100</sup> The much more modest aim of this section is to take some steps towards assessing the extent to which these two theories represent a challenge for Husserl’s conception of science. That considerations of this kind are required follows from the phenomenological theory of science itself. Let us first notice that we are considering two *empirical theories*, which, as such, pending the resolution of the problems affecting their internal as well as mutual logical consistency, count as possible correlates of theoretical consciousness. However, we also know that the transcendental theory of scientific knowledge must be applied to the *de facto* existing empirical sciences in order to “philosophize” them, to convert them into genuine sciences of reality (metaphysics). Thus, integrating the “new physics”<sup>101</sup> in the

universe of phenomenological philosophy is a necessary task for phenomenology. I will begin by discussing quantum mechanics because in a short appendix to *Krisis* written in June 1936, Husserl makes some important remarks about it. In this text, Husserl does not use the standard terminology of quantum mechanics (wave functions, eigenvalues, indeterminacy, etc.), nor does he refer to any scientific publications. This renders its interpretation rather difficult. In what follows, I will focus only on its most significant aspects in the context of this study. However, I believe that these few pages would deserve a longer and much more detailed commentary, because they contain ideas that are potentially very fruitful for a philosophical understanding of quantum mechanics itself.

Husserl opposes the causal style of explanation of classical and quantum physics. In classical physics, nature is conceived as composed of ultimate indivisible constituents, such as atoms, the individual behavior of which are completely determined by the laws of nature. The causal properties of each part of nature, whether an individual atom or an aggregate of atoms, completely determine its being.<sup>102</sup> This is, we could say, the nature of Laplace's thought experiment. In the "new physics," instead, this complete, univocal determination of every component of nature according to laws does not hold.

Determinate nature can be univocally calculated according to groups, and to corresponding types, but not according to the individual elements of the group, that is, with respect to the movements and other alterations of such elements. Since nature's universal conformity to laws deductively includes *only types* as univocally calculable – in other words, since the nature of natural science is only a nature typical in itself – the alterations of the ultimate elements are predetermined only with probability, after the type to which they belong, and which predetermines a certain margin ("*Spielraum*") and nothing more.<sup>103</sup>

In nature as described by quantum mechanics, so I read this passage, causality does not apply in the same way at the level of the ultimate individual component of matter, a single electron or photon, and at the level of a group of such entities. The behavior of a (presumably very large) *group* of elementary components can be completely determined based on the laws of nature, but not that of each individual component. To supply an example, while the interference pattern produced by a stream of electrons in a two-slit experiment is perfectly predictable on the basis of the relevant initial conditions, the trajectory of each electron is not. An individual electron obeys only to a probabilistic causality, which is specific to the type "electron." Here, Husserl refers to the fact that a wave function

expressing the *state* of a single electron only allows for the calculation of the probability distribution of the measurements' outcomes. However, Husserl immediately adds, this does not imply the existence of "chance in the sense of causally undetermined events."<sup>104</sup> The difference is only that now each event is determined, not on the basis of its complete individual determination, but on the basis of the group to which it belongs. Husserl concludes, "the new physics is the physics of a nature conceived in an individual-typical way."<sup>105</sup> This is probably the most interesting claim we find here. What Husserl seems to be saying is that the defining feature of the nature of classical physics was to be completely "constructible" out of elementary constituents (atoms), the causal states of which could be determined by their intrinsic properties and mutual relations. In such a nature, there are of course different aggregates of atoms, but not different causally relevant *types of entities*. Any portion of matter can be characterized based on its intrinsic properties and the corresponding laws. In quantum mechanics, instead, this construction "from below" is impossible. We cannot predict the result of the two-slit experiment by composing the trajectories of each electron of the stream, because these trajectories are not exactly calculable. On the contrary, an individual electron partakes in causality by virtue of being an element of a group, an element belonging to a certain type. The causally relevant descriptive level of the new physics is thus a given group under certain empirical conditions, not an individual particle. Husserl draws two conclusions from this fact. The first is contained in this passage.

Everything, ultimate elements as well as wholes, must be taken in an individual-typical way and idealization and mathematization are always only a method, which does not overcome the relativity of intuition, as it did according to the old classical attitude, but remains itself in relativity and satisfies, at always new levels, the being-always-in-relativity.<sup>106</sup>

Husserl does not claim that the idealizing procedure of physics does not overcome the subjective-relative character of perception, nor that quantum physics does not aim at an objective account of reality. His general views about the essence of mathematization are not affected by these claims. Rather, he seems to say that classical physics was wrong in thinking that it could be possible to replace the relativity of empirical nature, with a final, totally irrelative, objective description built on its ultimate constituents. Since the new physics studies groups of entities in their typical behavior, it must rely on idealizations that are relative to a certain level of description. Thus, a certain relativity *to the level of description* is maintained, which is, to be sure, different in character from the one inbuilt in perception.

The second conclusion, which Husserl considers more important, is that the new physics has acquired a method to determine natural being “in concretion” (in an aggregate), rather than individually. Husserl here seems to derive from quantum mechanics a non-reductionist view of nature that is certainly more akin to his general outlook. The physical world is not a simple sum of atoms; it is a highest concretum articulated into higher and lower level concretions according to a law of construction.<sup>107</sup> Physics studies such concretions. That Husserl is trying to push the new physics in the direction of anti-reductionism is also clear from the conclusion of this text, where Husserl adds that physiology and biophysics cannot be completely reduced to physics.<sup>108</sup>

In this appendix, Husserl does not directly address the well-known problem of the interpretation of the mix-states of a quantum system,<sup>109</sup> nor does he attempt a characterization of the role of measurement in quantum physics. However, he certainly does not seem to consider the new physics as a threat to the phenomenological theory of science. Far from it. Husserl speaks as if it marked progress with respect to classical physics, not only from the empirical but also from the methodological point of view. The new conception of idealization would be more compatible with the conception of nature and natural science that stems from phenomenology. Whether or not this is right, I am not sure, but I do not see any apparent in-principle clash between quantum mechanics and the phenomenological account of science. As we are about to see, this situation becomes far more problematic as we move to the theory of relativity.

The problem can be formulated in rather simple terms. Husserl repeats time and again that the pure doctrine of space (geometry), the pure doctrine of time (chronology), and the pure doctrine of movement based on them (phoronomy or kinematics) are Euclidean. These eidetic disciplines belong to the a priori ontology of nature because they describe invariant features of *any possible* material nature, they are rooted in the essence of the region “material thing” (see Chapter 2, §6). However, even in special relativity, space, time, and movement are characterized in a manner that is incompatible with Euclidean geometry. Lorentz transformations, in contrast with Galileo’s, require a *non-Euclidean* metrics. With general relativity, the situation only gets worse since space-time has, in addition, a curvature that is determined by the stress-energy tensor. As we have seen, at the beginning of his career (see Chapter 2, §1) Husserl believed the three-dimensional and Euclidean character of space to be an empirical fact on a par with the laws of nature. In the *Logical Investigations*, instead, he proclaimed that only authentic, physical space must have Euclidean form, and that all other “spaces” are empty categorial forms that cannot have “metaphysical” value (see Chapter 2, §4). Let us underline that the advent of relativistic physics has raised difficulties that are essentially different from the ones discussed in the

19th century in the wake of Gauss's measurements. The debate, at that time, concerned the empirical possibility that space might have a non-perceivable but measurable curvature. This is indeed the question that Husserl discussed in his early works on space. The radical novelty of Einstein's theory of special relativity (1905) consists in the fact that it is impossible even to treat separately the mathematical forms of space and time: under Galileo's transformations, space and time intervals are two independent absolute invariants; under Lorentz transformations, they are not – only the space-time interval is. Once more, this problem is carried over to general relativity, where, in addition, the total form of space-time cannot be treated separately from the "material stuff" filling it. Space-time is thus no longer a pregiven and predefined form in which matter is situated, and its metrics depend on the contingent distribution of matter in the universe.

Admittedly, Husserl's silence on this issue is embarrassing, in spite of the clear textual evidence that he acknowledged the progress accomplished by Einstein. The research of his disciple Oscar Becker, who, in his 1923 dissertation, tried to give a phenomenological interpretation of the new space-time theories<sup>110</sup> and his exchange with the great mathematician Hermann Weyl attest to his interest for Einstein's discoveries,<sup>111</sup> while, in the *Krisis*, he explicitly mentioned Michelson and Morley's experiments<sup>112</sup> and even granted that Einstein revolutionized the scientific conception of space-time<sup>113</sup> (though not the intuitive experienced space and time, as he says in the *Vienna Lecture*<sup>114</sup>). Yet, he never developed a detailed analysis of how Einstein's revolution impacted his own account of the "a priori part" of physics or, more generally, his theory of science.<sup>115</sup> I believe the latter cannot remain as they are once relativistic physics is taken into account. To be sure, in principle, one could try to hold on to the a priori eidetic character of Euclidean geometry and dismiss the theory of relativity as a mere provisional mathematical device. The task would thus be that of contriving a new theory that encompasses the empirical predictions of relativistic physics while preserving the Euclidean form of space and time. Husserl never demanded that such a quixotic endeavor be attempted, and, I would add, with good reasons. The only way out is to use the theory of relativity as an indication that the phenomenological account of idealization must be revised. I have just recalled that Husserl hoped to ground the a priori mathematical disciplines of material nature in the eidetic components of the thing of perception. Euclidean geometry, then, would directly stem from the spatial eidetic component of material things and would thus unconditionally hold for any natural process. One way out could consist in "liberalizing" the procedure of idealization: the empirical, prescientific intuition would not univocally determine the corresponding ideal form. Most of all, one should take into account the fact that there need not be two independent a priori forms for space and time,

nor an a priori form of space independent from materiality. The thing of perception, thus, should count as an indication of possible space-time mathematical theories in which its eidetic traits are, so to speak, freely recombined.

I do not intend to underplay the difficulties that such an attempt might raise for Husserl's account of idealization and for his conception of mathematics more broadly. It is also unclear to what extent one could still speak of an a priori part of mathematical physics. In addition, the gap existing between empirical and idealized nature would become much larger. However, the fundamental intuitive eidetic traits of the former would not vanish. Empirical nature would still count as the sphere of spatiotemporal bodies, sharply separated from living nature and, even more radically, from the region of spirit. The eidetic features of the prescientific life-world would not have to change, nor would the general sense of its transcendental constitution. Furthermore, the fundamental results so far discussed (the relations between the thing of physics and the thing of perception, the refutation of critical realism, the account of the motivation for idealizing nature, etc.) are not affected by Einstein's theoretical breakthrough.

## §9. Summary and Conclusion

With this chapter, the reconstruction of the general features of the relation between transcendental phenomenology, natural science, and metaphysics is complete. I have tried to show that *Ideas II* coherently pursues the project outlined in *Ideas I* without modifying or breaching any of its guiding principles. Whereas *Ideas I* clarifies the sense and possibility of the transcendental constitution of the thing of physics, *Ideas II* offers the only extensive, albeit preliminary, treatment of such constitution in Husserl's entire corpus. It has appeared that, in such constitution, the *Leib* plays a twofold essential role. First, the relativity of the perceived properties of material thing to the aesthetic *Leib* reveals that a scientific determination of nature cannot rest content with such properties. Second, the spatiotemporal framework in which the *Leib* and the perceived things with which it stands in causal relation are situated (the objective form of any natural object) provides the basis for the mathematization of material nature.

In order to stress the continuity between *Ideas I* and these analyses, I have developed an extensive criticism of Rang's interpretation according to which *Ideas II* is a text written under Helmholtz's influence, as well as of Ingarden's contention that Husserl failed to provide a satisfactory transcendental account of the transition to the idealized nature of physical theory and that he has, presumably unwillingly, resorted to arguments of the critical realists at odds with his own method. I have

located the source of such misunderstandings not only in the failure to grasp the implications of §52 of *Ideas I*, but also in the unfortunate situation that *Ideas II* contains only a pre-transcendental investigation into the constitution of nature carried out in the naturalistic attitude. Such investigation rests partly on eidetic (but not transcendental) analyses pertaining to psychology and the a priori ontology of nature, as well as, partly, even on empirical facts pertaining to physiology and psychophysics. Husserl has explicitly mentioned the necessity and possibility of the eidetic-transcendental conversion of his results. I have outlined how such a conversion can be conducted. This analysis has highlighted that the mathematization of material nature presupposes the previous constitution of *the intuitive psychophysical nature of which embodied subjects are a component*, that the causal and conditional relations existing *within* such nature, between embodied subjects and perceivable things, motivate the transition to mathematical physics. This result illuminates the essential difference between transcendental phenomenology and modern metaphysics. For Descartes, positing material nature as a mathematical being in itself amounted to trespassing the boundaries of the “mind” and gaining access to the “external world.” For Husserl, the *mathematization of nature is an intra-worldly process accomplished by embodied subjects*, which presupposes the constitution of the intuitive transcendent psychophysical nature within transcendental intersubjectivity. For this reason, mathematical physics presupposes, by essence, psychology, physiology, and psychophysics. The recourse to causal and conditional relations thus does not infringe on the phenomenological method in the least. Such relations belong not only to the *de facto* appearing nature-phenomenon, but also to any conceivable (well-ordered) nature-phenomenon. By eidetic necessity, they all contain embodied subjects endowed with a psychophysical conditionality that reveals the relativity of the “*Aestheta* to the aesthetic *Leib*” and motivates setting the goal of mathematization. Thus, the aforementioned empirical facts obtaining in this nature, after being reduced to pure phenomena, can be used as the starting point of an eidetic variation over all possible nature-phenomena. Helmholtz’s “facts in perceptions” become the starting point of a transcendental-eidetic insight. Let us also stress that the intra-worldly character of the mathematization of nature anticipates, in part, Husserl’s claim, in the *Krisis*, that the life-world, of which nature is but an abstract layer, is the presupposition and sense-fundament of modern physics.

Both *Ideas I* and *Ideas II* make only a few scattered remarks on the idea of metaphysics. I have tried to show, however, that these two works must be understood in light of Husserl’s idea of the conversion of empirical sciences into metaphysics as the ultimate science of reality. In *Ideas I*, we have seen how transcendental phenomenology elucidates the sense of the world and removes its erroneous ontological interpretations. This



has allowed for the identification of the real object of physical theory. *Ideas II* has offered an outline of the transcendental theory of the knowledge of nature. Furthermore, I have argued that the thing of physics, due to its mathematical and, thus, irrelative character, is the ultimate natural objectivity beyond which it is absurd to seek any other reality. Therefore, the natural sciences, once their specific conceptual material is fully elucidated, can acquire the status of ultimate knowledge of reality. These results have provided the resources to complete the criticism of the positions presented in Chapter 1 and to show that transcendental phenomenology can counter both Du Bois-Reymond's metaphysical skepticism and Mach's phenomenalist elimination of the very concept of metaphysics. Finally, I have argued that, while a reform of Husserl's theory of science is needed in order to take into account the modification of the concepts of space and time introduced by the theory of relativity, the possibility of a transcendental phenomenological elucidation of such a theory remains open.

Their density and complexity notwithstanding, Husserl's constitutive analyses in *Ideas I* and *Ideas II* remain one-sided. As we shall see in the next chapter, a complete elucidation of natural-scientific knowledge and of the sense of its truth can occur only if science is brought back where it ultimately belongs, i.e., in the personalistic world of cultural formations. Only in this way will the positive sciences regain their place in the "universe of philosophical truth," where they are but branches of the universal science of being.

## Notes

1. *Ideas II*, p. 3.
2. *Ideas II*, p. 4.
3. *Ideas II*, p. 3.
4. *Ideas II*, p. 4.
5. *Ideas II*, pp. 27–28.
6. *Ideas II*, p. 30.
7. *Ideas II*, p. 30.
8. *Ideas II*, p. 38.
9. *Ideas I*, p. 361.
10. *Ideas II*, p. 40.
11. *Ideas II*, p. 40.
12. *Ideas II*, p. 44.
13. *Ideas II*, p. 48.
14. *Ideas II*, pp. 46–47.
15. *Ideas II*, p. 82.
16. For a detailed analysis of Husserl's notion of *Leib* in *Ideas II*, see Behnke (1996, pp. 135–160). The article, however, does not focus on the role played by the *Leib* in the establishment of the primary/secondary properties distinction.
17. In the real-immanent content of perceptual consciousness there resides not only the hyletic data of sensation, which are apprehended by the noeses in such a way that they adumbrate the directly perceivable properties of what

- appears as a transcendent sensuous schema, but also the data that merely govern the regulated flows of subsequent adumbrations.
18. *Ideas II*, §§36–38. The localization of touch sensations, for instance, is more primordial and direct than the localization of visual and acoustic sensations. And those localizations are in turn different from the localization of kinesthetic data.
  19. *Ideas II*, p. 70.
  20. *Ideas II*, p. 71.
  21. *Ideas II*, p. 69.
  22. *Ideas II*, p. 355.
  23. *Ideas II*, p. 355.
  24. *Ideas II*, p. 355.
  25. *Ideas II*, p. 64.
  26. The relation between normal and optimal is much more complex than this simple example suggests. For a detailed discussion, see Steinbock 1995, pp. 138–147. On embodiment and normality, see also Taipale 2014, pp. 123–124.
  27. *Ideas II*, pp. 65–66.
  28. *Ideas II*, p. 66.
  29. *Ideas II*, p. 67.
  30. *Ideas II*, p. 78.
  31. *Ideas II*, p. 81.
  32. This abruptness has been noted also by Paul Ricœur (Ricœur 1967, p. 50). However, in the following sections, I attempt to show that Husserl's text contains many elements enabling the reader to take the baton from Husserl here.
  33. As Husserl says already in *Ideas I*, §40.
  34. *Ideas II*, p. 88.
  35. *Ideas II*, p. 88 passim.
  36. *Ideas II*, p. 91.
  37. *Ideas II*, p. 89.
  38. *Ideas II*, p. 89 (quotation marks present in the original text, but omitted in the translation).
  39. This does not amount to saying that all properties of physical theory must be mechanical in the technical sense of the word. Light waves are an electromagnetic phenomenon. However, they involve a “geometrization of light” essentially akin to mechanical processes, in that only quantitative properties occurring in space and time are retained.
  40. On the link between mathematization and objective truth, see also Hua Mat IV, p. 211.
  41. See *Ideas III*, p. 54: “Physics *eliminates* the relation to the ‘normal organization.’ It says: normality is something accidental completely relative, and accordingly that Objectivity which is constituted out of such agreement is not any less a relative and accidental one.”
  42. In this sense, the objectivity of nature ultimately rests on the objectivity of mathematical idealities, which Husserl had established in the *Prolegomena*.
  43. *Ideas II*, p. 89.
  44. *Ideas II*, p. 89.
  45. On the theme of the divisibility of matter, see also *Ideas II*, pp. 54–55.
  46. *Ideas II*, p. 90.
  47. *Ideas II*, p. 90.
  48. *Ideas II*, p. 90.
  49. Unlike the observable-unobservable dichotomy.
  50. *Ideas II*, p. 92

51. *Ideas II*, p. 93.
52. Rang 1990, p. 394.
53. Rang 1990, p. 370.
54. Rang 1990, pp. 373–374. Rang also considers whether Duhem could have exerted an influence on Husserl's thought, but he underplays that possibility because of the absence of textual evidence and because of the already mentioned lack of marks in Husserl's copy of Duhem's main work. Of course, the Duhem invoked by Rang refers not to the nostalgic advocate of scholastic metaphysics but to the epistemologist sympathetic to the principle of economy.
55. Rang 1990, p. 374.
56. Rang 1990, p. 374.
57. Rang 1990, p. 378.
58. Let us also recall that Husserl disparaged this "opportunistic" and anti-metaphysical attitude of working scientists in regards to the mechanical analogical models they use in order to formulate predictively accurate laws (see Chapter 2, §3).
59. Rang's reading of §52 of *Ideas I* is similar to the one that Hardy has more recently proposed and difficult to tell apart from phenomenism for the same reasons (see Chapter 3, §7).
60. The reader acquainted with Husserl's discussion of Descartes and especially Locke's theory of perception in *First Philosophy* will agree that the importance of critical realism as an antagonist of phenomenology should not be overstated. As already stressed, at bottom, all existing epistemological standpoints are, for Husserl, so many variations of motives that are to be found in the series of authors going from Descartes to Kant. Critical realism, in spite of the sophistication of its scientific critique of experience, does not add anything essentially new to the development of modern philosophy.
61. Rang 1990, p. 381.
62. We can thus appreciate the difference between Descartes' and Husserl's use of the expression "*res extensa*." For Descartes, "*extensio*" is the name of the essential attribute of a substance, whereas, for Husserl, it is an eidetic trait of a constituted unit of sense. Such is the difference between physical nature as a *metaphysical* substraction (Descartes' *res extensa*) and physical nature as an ontological region in Husserl's sense. One is a being to be validated by means of a demonstration, the other is a being that is to be elucidated by a theory of constitution. Only by understanding that the former has been surreptitiously replaced by the latter can one appreciate the *Leitmotif* of the *Krisis*.
63. This is different from saying that nature *is* a mathematical manifold by itself and in itself, before and independent of any relation with consciousness. This claim, as we shall see, is the objectivist poison that Galileo unintentionally injected into the young body of modern philosophy.
64. Rang 1990, pp. 372–372.
65. *Ideas II*, p. 27.
66. *Ideas II*, p. 28.
67. In the Appendix II of the *Krisis (Idealization and the Science of Reality)*, a text presumably written before 1928), we read the following: "In practical life the 'exact' is determined by the [particular] end in view; the 'equal' is that which counts equally for this end, for which there can also be irrelevant differences which do not count" (*Krisis*, p. 311). Of course, the "equal" in this metric sense is a precondition and together a perfect epitome of the possibility of unambiguously identifying an object.
68. *Krisis*, p. 280.

69. Ricœur is attentive to the relations existing between *Ideas II* and the *Krisis* (Ricœur 1967, p. 45), but he over-emphasizes the contrast between the eidetic analysis of perception contained in the former and the historical considerations developed in the latter. Indeed, the interplay between the different attitudes in *Ideas II* already provides the eidetic framework for Husserl's later analyses. Ricœur's appraisal is probably resultant from his regarding the *Krisis* as a sudden and unprecedented irruption of the theme of history in Husserl's philosophy (Ricœur 1967, p. 143), which, by now, we know not to be the case.
70. Heidegger 1967.
71. Merleau-Ponty 1992, pp. 102–112; Patočka 1992, Chapter VIII.
72. See, most of all, Gurwitsch 1956, 1974; Heelan 1987; Ströker 1987, 1988. Most of the other works by Heelan develop Husserl's and Heidegger's insights in a rather eclectic way. In recent years, continental philosophers have become more interested in the scientific worldview.
73. Ingarden 1964, p. 366.
74. Ingarden 1964, p. 357.
75. See also Ingarden 1964, p. 383.
76. In contrast with this tendency, the German language has retained the word *Wissenschaftstheorie*, which at least evokes the old idea of a doctrine of science.
77. Ingarden 1964, pp. 367–374, 383–386. Merleau-Ponty, in his lectures on nature, does so too, without however offering a detailed account of the reason way he thinks this to be the case. Merleau-Ponty 1992, pp. 112–113.
78. Ingarden 1964, p. 385.
79. Ingarden 1964, pp. 384–385.
80. Ingarden 1964, p. 386. Ingarden also wrongly criticizes Husserl's characterization of the difference between the thing of perception and the thing of physics by invoking the new means of detection available to experimental physicists (Ingarden 1964, pp. 390–394). I will not repeat here the considerations developed in Chapter 3, §7. I am also persuaded that all other objections raised in this text can countered from Husserl's standpoint, but I have chosen to focus on the issue that is most significant for the topic of this book.
81. Ingarden 1964, p. 368.
82. Ingarden 1964, pp. 369–370.
83. Ingarden 1964, pp. 385–386.
84. Beiser 2014, p. 198.
85. *Ideas II*, p. 183, *passim*. In an interesting footnote, Ingarden relates that, during the conference, Herr Kern (presumably, Iso Kern) objected that the first part of *Ideas II* was written by taking up the naturalistic attitude and that, subsequently, Husserl would have accomplished a final conversion to the transcendental point of view. Kern was certainly referring to this passage. Merleau-Ponty, too, mentions this (Merleau-Ponty 1992, p. 112), but, to say the least, he does not make much of it. Ingarden answers this question by reasserting his doubts about the possibility of this reconciliation with the transcendental method (Ingarden 1964, pp. 372–373).
86. “The Constitution of Material Nature” and “The Constitution of Animal Nature.”
87. Not only transcendental phenomenology, but also psychology must work in parallel with ontology.
88. Ingarden also quotes this passage of *Ideas II* (Ingarden 1964, p. 370). Rang too sees it as another sign of Husserl's dependence, in *Ideas II*, on Helmholtzian presuppositions that are incompatible with his own method. Rang 1990, pp. 370–373.

89. This, let us remember, amounts *ipso facto* to the chapter of the theory of knowledge that pertains to nature in general.
90. “Phenomenology as the pure science of the transcendental phenomena is also the science of the phenomenon ‘a nature in general,’ just as it is the science of the phenomenon ‘*this existing nature*’” (Hua XXV, p. 120).
91. A perceptual environment so chaotic as to rule out any orderly opposition between normal and abnormal perception would hardly deserve to be called a nature. If, however, one were to insist on ranking it under the heading of nature, it would amount to a quasi-objective nature incapable of being mathematized. Husserl’s eidetic considerations would then be restricted to the type of nature-phenomenon admitting, at least to some extent, mathematical objectivation.
92. *Ideas II*, p. 94.
93. Galileo’s famous “*rimosso l’animale*” presupposes, indeed, that the “animal” is there and that its causal relations with the environment have been taken into account.
94. *Ideas II*, p. 400. See also Hua Mat IV, pp. 195–196.
95. We know (see Chapter 4, §2) that abnormal perceptions do not contribute to the constitution of the perceived objects. This example highlights that it belongs to the sense of the psychology of perception that the experimental subject’s contribution to the constitution of the surrounding things is put out of action, whether its perceptions are abnormal or not. We are simply not interested in it.
96. This critique is already developed in the *Logical Investigations* (Hua XIX/1, p. 371).
97. *Ideas II*, p. 218.
98. This objection to Du Bois-Reymond is similar indeed to the one that, as we know, was formulated by Ostwald (see Chapter 1, §2) but is based on different foundations, which are not methodological, nor empirical, but phenomenological.
99. Hua XV, p. 36.
100. Recent years have seen a growing number of philosophical analyses of contemporary physics that draw more or less directly from Husserl’s philosophy. The interest for this field of studies is definitely on the rise, as is attested by the several conferences and research projects dedicated to these topics. An extensive overview of these studies is in Berghofer and Wilsche (2020).
101. Hua VI, p. 387.
102. Hua VI, p. 387.
103. Hua VI, p. 388.
104. Hua VI, p. 388.
105. Hua VI, p. 388.
106. Hua VI, p. 389.
107. Hua VI, p. 390.
108. Hua VI, p. 391.
109. For an overview of this problem, see, for instance, Redhead 1987, pp. 44–45.
110. Becker 1973.
111. See Ryckman 2005, pp. 108–115, 128–129. See also Hua XXXII, pp. XIII–XIV.
112. *Krisis*, pp. 125–126.
113. *Krisis*, p. 4.
114. *Krisis*, p. 295.

115. In at least one occasion, in 1919, Husserl explicitly evokes the possibility of worlds whose spatial form is not Euclidean, and, once more, he mentions the metaphysical significance of this problem. Yet, he does not discuss it in relation to Einstein's theory (see Hua Mat IV, pp. 153–161). Let us also notice that these pages seem at odds with Husserl's earlier claims about the Euclidean character of space in the *Prolegomena*.

## Bibliography

- Becker, O. (1973). *Beiträge zur phänomenologischen Begründung der Geometrie und ihrer physikalischen Anwendungen*. Tübingen: Max Niemeyer Verlag.
- Behnke, E. (1996). Edmund Husserl's contribution to phenomenology of the body in Ideas II. In: T. Nenon and L. Embree, eds., *Issues in Husserl's Ideas II*. Dordrecht: Springer, pp. 135–160.
- Beiser, F. (2014). *The Genesis of Neo-Kantianism: 1796–1880*. Oxford: Oxford University Press.
- Berghofer, P. and Wiltse, H. (2020). Phenomenological approaches to physics: Mapping the field. In: P. Berghofer and H. Wiltse, eds., *Phenomenological Approaches to Physics*. Cham: Springer.
- Gurwitsch, A. (1956). The last work of Edmund Husserl. *Philosophy and Phenomenological Research*, 16(4), pp. 380–399.
- Gurwitsch, A. (1974). *Phenomenology and the Theory of Science*. Evanston, IL: Northwestern University Press.
- Heelan, P. (1987). Husserl's later philosophy of natural science. *Philosophy of Science*, 54, pp. 368–390.
- Heidegger, M. (1967). *What Is a Thing?* Chicago: Henry Regnery Company.
- Hua III/1. Husserl, E. (1976). *Ideen zu einer reinen Phänomenologie und phänomenologischen Philosophie, Erstes Buch: Allgemeine Einführung in die reine Phänomenologie*. The Hague: Martinus Nijhoff; *Ideas Pertaining to a Pure Phenomenology and to a Phenomenological Philosophy, First Book*. F. Kersten (Trans.). The Hague: Martinus Nijhoff, 1983.
- Hua IV. Husserl, E. (1952a). *Ideen zu einer reinen Phänomenologie und phänomenologischen Philosophie, Zweites Buch: Phänomenologische Untersuchungen zur Konstitution*. The Hague: Martinus Nijhoff; *Ideas Pertaining to a Pure Phenomenology and to a Phenomenological Philosophy, Second Book*. R. Rojcewicz and A. Schuwer (Trans.). Dordrecht: Kluwer, 1989.
- Hua V. Husserl, E. (1952b). *Ideen zu einer reinen Phänomenologie und phänomenologischen Philosophie, Drittes Buch: Die Phänomenologie und die Fundamente der Wissenschaften*. The Hague: Martinus Nijhoff; *Phenomenology and the Foundations of the Sciences*. T. Klein and W. Pohl (Trans.). The Hague: Martinus Nijhoff, 1980.
- Hua VI. Husserl, E. (1954). *Die Krisis der europäischen Wissenschaften und die transzendente Phänomenologie: Eine Einleitung in die phänomenologische Philosophie*. The Hague: Martinus Nijhoff; *The Crisis of European Sciences and Transcendental Phenomenology*. D. Carr (Trans.). Evanston, IL: Northwestern University Press, 1970.
- Hua XV. Husserl, E. (1973). *Zur Phänomenologie der Intersubjektivität. Dritter Teil: 1929–1935*. The Hague: Martinus Nijhoff.

- Hua XIX/1. Husserl, E. (1984). *Logische Untersuchungen. Zweiter Band. Erster Teil. Untersuchungen zur Phänomenologie und Theorie der Erkenntnis*. The Hague: Martinus Nijhoff.
- Hua XXV. Husserl, E. (1987). *Aufsätze und Vorträge (1911–1921)*. Dordrecht: Martinus Nijhoff.
- Hua XXXII. Husserl, E. (2001). *Nature und Geist*. Dordrecht: Kluwer Academic Publishers.
- Hua Mat IV. Husserl, E. (2002). *Natur and Geist. Vorlesungen Sommersemester 1919*. Dordrecht: Kluwer Academic Publishers.
- Ingarden, R. (1964). Husserls Betrachtungen zur Konstitution des Physikalischen Dinges. *Archives de philosophie*, 27, pp. 356–407.
- Merleau-Ponty, M. (1992). *Texts and Dialogues*. New York: Humanities Books.
- Patočka, J. (1992). *Introduction à la phénoménologie de Husserl*. Grenoble: Jérôme Millon.
- Rang, B. (1990). *Husserls Phänomenologie der materiellen Natur*. Frankfurt am Main: Klostermann.
- Redhead, M. (1987). *Incompleteness, Nonlocality, and Realism*. Oxford: Clarendon Press.
- Ricœur, P. (1967). *Husserl: An Analysis of His Phenomenology*. Evanston, IL: Northwestern University Press.
- Ryckman, T. (2005). *The Reign of Relativity*. Oxford: Oxford University Press.
- Steinbock, A. (1995). *Home and Beyond*. Evanston, IL: Northwestern University Press.
- Ströker, E. (1987). *The Husserlian Foundation of Science*. Washington, DC: University Press of America, 1987.
- Ströker, E. (1988). Husserl and philosophy of science. *Journal of the British Society for Phenomenology*, 19(3), pp. 221–234.
- Taipale, J. (2014). *Phenomenology and Embodiment*. Evanston, IL: Northwestern University Press.

## 5 Life-World, Natural Science, and the Crisis of Philosophy

### §1. The Crisis of European Sciences as the Repercussion on Their Scientificity of the Crisis of Philosophy

In this chapter, I will propose a reading of the aspects of the *Crisis of the European Sciences and Transcendental Phenomenology* that are most relevant to the issues addressed in this book, and I will do so by situating this Husserlian text in the overall intellectual evolution reconstructed in the previous chapters. The attempt will be, once more, to show that the *Krisis* reinforces Husserl's general outlook while at the same time enriching it and clarifying it in many respects.<sup>1</sup> Unfortunately, this last, unfinished work heavily relies on a terminology that was unfamiliar to the readers of his main published texts. This is only partly the case for the term "life-world," but it is certainly so for terms such as "crisis," "backward questioning," "origin," and "internal history," which Husserl had hardly or never used before. The role that historical considerations play in the *Krisis*, as well as the rhetorical pathos of the introductory considerations, which resonate with the tragic political context of the time, have not helped readers to see this book as Husserl's last attempt to formulate a great synthesis of his attempted reform of philosophy, rather than yet another alleged turn in his intellectual evolution. To be sure, considerable effort is required to connect this text with Husserl's previous intellectual developments. By doing so, however, it is possible to downplay its apparently new and "romantic" aspects and highlight the way Husserl's analyses in the *Krisis* expand and clarify the results achieved in his earlier research.

A concept that has been the object of several misunderstandings is precisely that of the *crisis of the European sciences*. Recently, I have proposed a definition of the crisis-concept that stresses its continuity with Husserl's concern for the philosophical foundations of the sciences.<sup>2</sup> According to this reading, Husserl's own strategy to circumscribe a notion that, in an age of triumphant scientific and technological progress, sounds highly paradoxical is rather convoluted and can thus be easily misunderstood. As we shall see, only after acquiring a correct understanding of the notion



of the crisis of European culture, philosophy, and science will it be possible to appreciate the implications of the famous section of the *Krisis* on Galileo.

In §1 of the *Krisis*, Husserl begins by stating very clearly that the crisis of a science can only consist in the fact that its scientificity, i.e., its task and method, becomes (to say the least) questionable.<sup>3</sup> This first, apparently obvious clarification contains the very essence of what, more generally, the crisis of a cultural formation is for Husserl, namely, a dramatic state of uncertainty and disorientation with respect to the essence inhabiting such a cultural formation as its *telos*. Now, Husserl is aware that everybody would grant that philosophy is in crisis since it is rather obvious that there is no clarity concerning its task and method. However, given that both natural sciences and the human sciences (albeit more problematically, especially in the case of psychology) continue to achieve remarkable theoretical and practical success following rigorous scientific methods, they certainly continue to manifest a *prima facie* scientificity. In order to gain access to the kind of deeper scientificity that has become questionable, i.e., in order to make sense of the claim that the triumphant positive sciences are also in a state of crisis, Husserl, in §2, turns to the widespread perception that our sciences have lost their significance for life. He refers to this cultural fact as the “crisis” (among quotation marks), and characterizes it as their loss of “*Lebensbedeutsamkeit*,” significance for life. This perceived “crisis,” which does not concern, by itself, the scientificity of the positive sciences and thus does not correspond to the aforementioned general crisis-concept, is for Husserl a fact revealing the nature of their pathology.<sup>4</sup> Such a loss is, for Husserl, a real phenomenon that is due to the prevailing narrow positivistic idea of science as only a science of facts to the exclusion from the horizon of science of all fundamental problems concerning *reason and unreason*. Husserl characterizes our scientific culture’s inability to address what is crucial for human existence in terms of their disconnectedness from the highest metaphysical questions that all have to do with the problem of reason.<sup>5</sup> It is extremely important to notice that these questions connect precisely to the second layer of metaphysics that, as we know, according to Husserl’s philosophical project, follows the “philosophization” of the sciences, their transformation into metaphysics of factual reality, and is based on it. Once the world as understood by the sciences is elucidated in its ultimate being, one must investigate whether such a world and human existence in it *have a sense*: whether nature and history have a sense, whether they point to an ultimate source of teleological sense, namely God. This rational normativity in all its different aspects is what positivism, due to its blindness to whatever is not a fact, is unable to address.<sup>6</sup>

However, the existential irrelevance of the positive sciences is a recent phenomenon, the reasons for which Husserl sets out to briefly indicate (a more detailed account follows in *Krisis II*).

In sections 2–4, Husserl reconstructs in a very succinct way the process whereby, during modernity, the revival of the ancient ideal of philosophy as the universal science of being led to the construction of theoretical systems (such as those of Descartes, Spinoza, and Leibniz). Such systems were able to assign to the different sciences a province of reality and a method capable of rationally determining it. It suffices to think of how the object of mathematical physics (i.e., what corresponds to its epistemic task) was interpreted by Descartes as the *res extensa*, by Spinoza as a mode of the only existing substance, and by Leibniz as a non-substantial nature “perceived” by the monads, which are the real substances. Furthermore the different sciences also acquired a significance for human existence in light of the idea of God.<sup>7</sup> In Husserl’s terms, modern metaphysics provided both an *interpretation* of the being the different sciences investigate and an account of the sense that the resulting rational totality of the world has for our existence. It is important to stress that, if Husserl insists on the connection between reason and unreason on the one hand and the “highest and ultimate questions” of metaphysics on the other, the problem of reason in its generality involves both the doxic acts whereby a real being is posited, and (subsequently) the evaluation of real being in relation to the aforementioned ultimate metaphysical questions. Reason, in this sense, is the title of all unconditionally valid norms and goals, necessarily correlated to a *rational world*. The collapse of modern rationalism, the causes of which Husserl only vaguely hints at in *Krisis I*,<sup>8</sup> and the eventual downfall of modern rationalism, which culminated with Hume’s empiricism, led to the *crisis of philosophy*, which neither Kant nor German idealism were able to overcome, and to the consequent final triumph of naturalism and positivism. This crisis, once more, concerns the scientificity of philosophy, for it concerns its inability to develop a correct method for its task, i.e., its inability to become the genuine universal science of being.<sup>9</sup>

Now, having gotten a better handle on the origin of the crisis of philosophy, Husserl is now in a position to answer the question posed in §1 concerning the nature of the crisis of the positive sciences. In §5, Husserl explains how the repercussion of the crisis of philosophy on the specific sciences led to *their* crisis. In spite of their *prima facie* scientificity, in spite of their constant success, the being they investigate becomes enigmatic and so, correlatively, do the truths they discover:

Yet the problem of a possible metaphysics also encompassed *eo ipso* that of the possibility of the factual sciences, since they had their relational meaning [*Sinn*] – that of truths merely for areas of what is – in the indivisible unity of philosophy. *Can reason and that-which-is be separated, where reason, as knowing, determines what is?*

(*Krisis*, p. 11)

This passage must be read in light of the development of Husserl's thought as reconstructed throughout this book. Sciences are about being. Their ultimate, fundamental scientificity concerns the way in which the being they investigate is correlated to reason, i.e., the form of the givenness of such being. In the case of the science of nature, the enigmatic character of this being was more than documented by the debate concerning the object of physical theory (see Chapter 1), and by the countless references that Husserl makes to the metaphysical positions that have tried to interpret the being of the world, without affecting the theoretical content of the sciences themselves (see Chapter 2). The crisis of positive sciences can now be characterized, at least in general terms:

Ultimately, all modern sciences drifted into a peculiar, increasingly puzzling crisis with regard to the meaning [*nach den Sinn*] of their original founding as branches of philosophy, a meaning [*Sinn*] which they continued to bear within themselves. This is a crisis which does not encroach upon the theoretical and practical successes of the special sciences; yet it shakes to the foundations the whole meaning of their truth [*ihre ganze Wahrheitssinn*].

(*Krisis*, p. 12)

Outside of the framework of the correlation between reason and being, the positive sciences are still able to progress, to *discover truths* about the world, laws of nature, elementary particles, fossils of species that existed in a distant past, facts about memory and imagination, social transformations, remnants of ancient civilizations, etc. They are likewise able to produce practical success. Yet, they amount to nothing more than “theoretical techniques” or “inauthentic sciences”; they are not philosophical sciences, not parts of metaphysics as the ultimate science of reality, for they ignore the sense of being of the province of the world they investigate.<sup>10</sup> They are the battlefield of opposing attempts to identify what they are really about and to justify accordingly their method. Consequently, their task, the determination of such being, becomes questionable, and so does their method. How can skepticism about such sciences be countered if their rationality is not clarified?

Thus understood, *Krisis I* reveals a movement from the loss of significance of positive sciences for life to understanding the crisis of philosophy as the discipline in the unity of which such sciences had a sense for life. Reflecting on the nature of the crisis of philosophy leads to the elucidation, “from above,” of the specific crisis of the positive sciences, which concerns them *qua* sciences, i.e., their *ultimate* scientificity. A difference between the general crisis of philosophy and the, so to speak, sub-crises affecting the positive sciences is evident. Whereas the positive sciences can enjoy theoretical and practical success, even

ignoring the rationality that still lives in them and that silently animates them, this is not the case for philosophy. Philosophy cannot be a theoretical technique. Its crisis is even more radical and prevents it from progressing in any methodic and “positive way.” This crisis emerges not only through the lack of consensus among different schools, but also through the failure to develop the parts of philosophy that were called to decide about the sense for human existence of the results of the other sciences. There is no scientific ethics, no scientific political science, no scientific teleological account of nature and history, no scientific theology. Unsurprisingly, deprived of any practical, axiological, and metaphysical frame, the way in which the positive sciences can contribute to wisdom and happiness and the way in which the world they describe can have a sense remain obscure. As we shall see in detail in the next section, the whole of European culture was bound to be affected by this phenomenon:

Thus the crisis of philosophy implies the crisis of all modern sciences as members of the philosophical universe: at first a latent, then a more and more prominent crisis of European humanity itself in respect to the total meaningfulness [*Sinnhaftigkeit*] of its cultural life, its total “*Existenz*.”<sup>11</sup>

## §2. The Crisis of Philosophy and the Forgetfulness of the World of Spirit

The introductory considerations of *Krisis I*, as we have seen, do not yet explain what determined the demise of modern rationalism. This is the theme of *Krisis II*. However, the relation between the long developments of *Krisis II* and the crisis-concept introduced in *Krisis I* are not easy to grasp without considering the analyses concerning the relations between the life-world, psychology, and phenomenology developed in *Krisis III*. Furthermore, this whole movement is not only extremely complex, it is also incomplete, for Husserl never wrote the remaining parts of the *Krisis*, which, presumably would have led back to the problem of a metaphysics founded in phenomenology. We can suppose that this was his intention on the ground of Fink’s *Outline for the Continuation of the Crisis*, a short text that, according to Biemel, Eugen Fink gave to Husserl before Easter 1936.<sup>12</sup> In Fink’s outline, a part of the treatise would have contained a number of further analyses concerning both morphological and ideal sciences and their relation to the life-world, followed by a section on “the ‘unity’ of science as the unity of a universal correlative-system” and culminating with a section on the phenomenological concept of metaphysics. The title of the last part of the *Krisis* would have been “The Indispensable Task of Philosophy: Humanity’s Responsibility for Itself.”<sup>13</sup>

The only text presenting a tight formulation of all the themes of the *Krisis* is the slightly earlier *Vienna Lecture*. To an extent, I believe that it is possible to read it as an abstract of the *Krisis*. In addition to its brevity, the *Vienna Lecture* has the advantage of foregrounding the connection between the crisis-concept and the notion of *Geist*, a theme which is hardly evoked in *Krisis I* but which, as we shall see, is indispensable to a correct understanding of §9 of the *Krisis*. This text admits of a very neat subdivision in four parts. The first part contains an explanation of the task at hand, namely, understanding the crisis of Europe in light of the idea of philosophy; some preliminary methodological considerations; and a plan of the following three parts of the lecture.<sup>14</sup> The second part (i.e., until the end of §1) characterizes the spiritual shape of Europe in light of the teleology inbuilt in the birth of philosophy and science in Greece. The third part (§2) reconstructs the reasons that led to the failure of modern rationalism and to the rise of naturalistic objectivism, which Husserl sees as tantamount to the dualistic interpretation of the world. And the fourth part (§3) provides the sought-for understanding of the crisis of European humanity based on such failure. As we are about to see, throughout the text, the relation between nature and spirit takes center stage.

Let us begin by noticing that the point of departure here, in contrast with *Krisis I*, is the attempt to characterize the notion of the crisis of European culture as a whole, not just as a crisis of the positive sciences. The latter expression is nowhere to be found in the *Vienna Lecture*. Likewise, we cannot find here the explicit mention of the “crisis of philosophy.” This terminological difference, however, does not point to any substantial discrepancy and is due to a different choice of exposition. The introductory remarks of the first part revolve around an obvious medical analogy, or, better, dis-analogy. While medicine is able to perform its therapeutic function on the human body, the sciences of spirit do not enjoy such success in their domain: they are unable to make such diagnoses and “heal” Europe of its cultural “illness.” Husserl then turns to a brief indication of how “those familiar with the spirit of the modern sciences”<sup>15</sup> would explain this fact. Since individual minds, as well as cultural formations, do not form an autonomous ontological realm but are just disconnected realities founded on physical bodies, their rigorous scientific understanding cannot rest content with intuitive, morphological formations that are characteristic of the sciences of spirit. Rather, it would have to be grounded on a psychophysical account, which ultimately would lead to the properly explanatory, idealized formations of natural science. While natural science can go beyond the morphological and subjective-relative by means of its idealizing procedure, which in turn is made possible by the unitary and self-enclosed character of material nature, the sciences of spirit are unable to do that on their own. Thus, they face a dramatic dilemma: either they remain at the intuitive, subjective-relative level and thus fail to acquire real explanatory and therapeutic power, or

they would have to follow the psychophysical path down to its details. However, the second alternative seems hopeless due to the unmanageable complication and intricacy of a hypothetical psychophysical account of cultural formations.

This answer, according to Husserl, is not only wrong, but, as it will appear later, itself a part of the illness of European culture that he sets out to identify.<sup>16</sup> In the remaining lines of the first part, he formulates two objections to such a view of the relation between natural and human sciences. First, nature becomes thematic in the sciences of spirit only as part of the *Umwelt*, as nature inasmuch as it is an object of representation. Thus, this nature-for-a-culture would in no way be a part of the object of natural science. The second objection is phrased as a question:

What is obviously also completely forgotten is that natural science (like all science generally) is a title for spiritual accomplishments, namely, those of the natural scientists working together; as such they belong, after all, like all spiritual occurrences, to the region of what is to be explained by humanistic disciplines. Now is it not absurd and circular to want to explain the historical event “natural science” in a natural-scientific way, to explain it by bringing in natural science and its natural laws, which, as spiritual accomplishment, themselves belong to the problem?<sup>17</sup>

It is quite clear that these two objections against naturalism are themselves preliminary and non-conclusive. The fact that natural science is a cultural phenomenon and thus requires a cultural explanation may be granted by those who think that culture itself is ultimately a natural phenomenon. Proving that this position is absurd and circular requires further insights. For the moment, however, Husserl has at least cleared the way for a consideration of spirit that is “purely spiritual” and whereby the naturalistic apperception of nature is at least provisionally suspended. This is what allows Husserl to claim that we have gained the right *attitude* to an inquiry about “our subject of spiritual Europe as a problem purely within the humanistic disciplines, and first of all in the manner of spiritual history.”<sup>18</sup> This attitude, although Husserl does not mention it here, is the *personalistic attitude*, which he discussed at length in the third section of *Ideas II*. In line with the aforementioned first antinaturalistic objection, the pivotal concept pertaining to the personalistic attitude is that of *Umwelt*. In the personalistic attitude, what is given to us is the surrounding world, which Husserl describes in the following terms:

[It] is comprised not of mere things but of use-Objects (clothes, utensils, guns, tools), works of art, literary products, instruments for religious and judicial activities (seals, official ornaments, coronation

insignia, ecclesiastical symbols, etc.). And it is comprised not only of individual persons, but the persons are instead members of communities, members of personal unities of a higher order, which, as totalities, have their own lives.<sup>19</sup>

When I am in the personalistic attitude, I do not regard myself as an organism that is part of nature, but *as a person that is the center of a surrounding world*, i.e., of a world that is familiar to me and is loaded with practical and aesthetic values. This attitude is not only predominant in prescientific life, but it is also at the basis of all human sciences, the objects of which are persons and associations of persons in relation with their surrounding world. In short, the correlate of the personalistic attitude is the *spiritual world*, just as the correlate of the naturalistic attitude is the natural world. The key to the difference between these two worlds is the specific form of their internal interconnectedness. The fundamental unifying principle of nature is *causality*, as is used in prescientific and scientific explanations,<sup>20</sup> which in the latter leads to the formulations of the laws of natural science. Husserl calls (following a long tradition) “motivation” the analogue of causality for the spiritual world, and he introduces this concept by reflecting on two different senses in which we speak of “stimuli.” In the personalistic attitude, instead of the “external,” physical, and “psychophysical” chain of events, we consider the intentional relation between subject and object and its motivational power.<sup>21</sup> Thus, the objects that I perceive, *as I perceive them*, are at the origin of tendencies that have more or less motivational force for me, to which I can resist or yield. *Values* in general are precisely what motivate the subject. This relation of motivation is so important within the spiritual world that Husserl also calls the personalistic attitude the *motivational attitude*.<sup>22</sup>

In light of these supplementations, we are in a position to bring into clearer focus the development of the *Vienna Lecture*. The second section (until the end of §1) can be summarized in the following way. European humanity is a supranational community of persons who share a surrounding world and who are motivationally responsive to values and norms. The specific spiritual shape of this community, in contrast with that of any other culture, arises in ancient Greece in the 6th century B.C.<sup>23</sup> with the birth of philosophy and science, which are characterized by a new attitude, based on the suspension of all practical interests of natural life: the theoretical attitude. Its correlate is being as such in its objective determinations. In contrast to the finite goals of prescientific life, the theoretical attitude corresponds to the ideal of a universal philosophy, which is an infinite task. Correlatively, there arises the idea of an open, universal humanity responsive to the value of theory and which is thus characterized by the new form of historicity, the historicity of the infinite tasks.

Philosophy and science aim at *theoria*, at the objective determination of *that which is*, independently of any practical interest. Now, natural

life, guided by practical interests, knows only the pursuit of finite tasks, i.e., tasks contained in the limited historical horizon of an individual or a community. Chasing animals, building a house for a family, storing firewood for winter, trading, taking part in deliberation, guiding an army – these are all activities that are carried out in a finite time, that have results the duration of which in the world is limited and the value of which are determined by the transient needs of the individual or the community in question. Philosophy and science yield theories, i.e., systems of truths, and truths are idealities that can be grasped in principle by any rational being, forever. The identity of ideality is, precisely, all-temporal or supra-temporal. Furthermore, to each science there pertains an infinite domain of research and each goal conceived by it is only a step in an infinite series of goals built one upon another.

Science, then signifies the idea of an infinity of tasks, of which at any time a finite number have been disposed of and are retained as persisting validities. These make up at the same time the fund of premises for an infinite horizon of tasks as the unity of one all-encompassing task.<sup>24</sup>

The task of a science is therefore always infinite and transcends the accomplishment of any individual or community. Finally, if it pertains to any scientific results to be verifiable at any time/for all time, then the process of verification is itself endless and the character of being a truth-in-itself remains “an infinitely distant point.”<sup>25</sup> In sum, Husserl characterizes the infinite of science along two principle directions: on the one hand, an extensive infinity of goals built one upon the other and corresponding to the object-domain of a science, and, on the other, an intensive infinity pertaining to each truth by virtue of the endless character of its verification. This new attitude, born in limited circles of thinkers, far from giving rise to a form of life that co-exists side by side with the previous culture was destined to transform and shape our entire civilization. This has happened by virtue of two forms of syntheses between the theoretical and practical attitudes.<sup>26</sup> One synthesis occurs in technology, whereby the theoretical determinations of reality are put in the service of a technical praxis governed by practical needs and goals. The second, far more interesting in this context, consists in the fact that philosophy submits all norms and ideals (cognitive, ethical, political, aesthetical, and religious) to a radical critique. Just as all prescientific world-representations are denounced as subjective-relative and become subject to the absolute norm of scientific truth, so such norms and goals measure their values against the ideal norms and goals of philosophy. “Thus ideal truth becomes an absolute value”<sup>27</sup> shaping the totality of culture. This ultimately leads to the idea of an entire civilization led by philosophy, which exerts its *archontic* function over it.<sup>28</sup>



This characterization of the spiritual shape of Europe, of the historical teleology of reason that constitutes its “entelechy,” provides, in keeping with the medical analogy, the physiological structure of Europe as a living cultural organism in which philosophy, as Husserl says, plays the role of a brain, on the healthy functioning of which the well-being of the entire form of life depends.<sup>29</sup> Everything is now in place for the analysis of the pathology and of its causes, which we find in the third part the *Vienna Lecture*, the most significant in the context of this study. Here is where, in a modified and enriched form, the theme of the absolutization of the world, so important in *Ideas I*, comes to the fore.

In *Ideas I*, more precisely, in the “Consideration Fundamental to Phenomenology,” we witnessed a drama, the main characters of which were world and consciousness. The absolutization of the world, also in the scientific version of critical realism, was opposed in order to achieve clarity concerning transcendental consciousness. Such philosophical distortion of the natural attitude had the necessary consequence of mundanizing consciousness and reducing it to an element of a causal chain, like an island surrounded by the external world, a colorful bubble, we said, founded on the body. Correlatively, the absolutization of the world implied that the sense of the transcendence of the world was missed. Those introductory considerations, however, did not take into account that the constituting subject is transcendental *intersubjectivity*, rather than an abstract individual consciousness. This was due to what can be considered an abstractive, “pedagogical” choice. In the *Vienna Lecture*, as well as in the *Krisis* as a whole, the absolutization of the world is criticized from the standpoint of the notion of *Geist*, conceived in its intersubjective and genetically structured dimension. The target of the criticism is now called *objectivism* (“taking the form of the various types of naturalism, of the naturalization of the spirit”<sup>30</sup>) but it is, at bottom, the same. What this more complete approach reveals is that the absolutization of the world leaves us not just with the island of consciousness, but with an archipelago of individual psyches founded on bodies, with a fragmentary spiritual being<sup>31</sup> as opposed to a unitary spiritual nexus. What is lost is not only, or ultimately, the idea of a constituting intersubjectivity, but the entire sphere of the world of spirit, and thus the object-domain of humanistic sciences. The *Vienna Lecture* contains a sketchy presentation of why this has happened. Philosophy is bound to proceed unilaterally and to be blinded by the partial successes it has achieved. This happened from the very beginning, when philosophy was conceived as cosmology and the world was regarded as the totality of being. But the advent of modern science has created a new and more extreme form of objectivism. In the old cosmology, the surrounding material world was still apprehended in the subjective-relative way in which it is given to intuition. The mathematization of

nature in the modern era has made possible the objectivation of such a world, and its infinitization through idealizing procedures (objectivation, idealization, and infinitization must be understood together), while the subjective-relative element itself has been confined within the fragmented being of the different psyches. Furthermore, the success of the new science led to the prejudice that psychology had to be developed as a parallel science that investigated an aspect of a psychophysical world unified by a single general form of causality and, thus, to the final interpretation of spiritual being as discontinuous and causally dependent on the physical world. In short, *the sense of being of both nature and spirit was missed*. A psychophysical psychology, a science of facts, is unable in principle to perform the task of understanding reason. Thus, it cannot provide the ultimate critique of reason, which in turn is necessary to elucidate rational norms and values. What is at stake is the possibility of an ultimate critique of reason on which the disciplines pertaining to theoretical, practical, and evaluative reason are founded. Husserl also specifies that overcoming the psychologism that naturally stems from such a conception of the subject is not enough, because only a self-enclosed unitary spirit can be the bearer of absolute norms and goals.<sup>32</sup>

As is well known, the roots of modern objectivism are identified by Husserl in the inability to acknowledge the founding role of the life-world (here tellingly called "*Lebensumwelt*"<sup>33</sup>). It is at this point that one can measure the advances made with respect to the approach of *Ideas I*. To be sure, the conclusions reached there still hold. The life-world presupposes the dimension of the transcendence constituted at the level of perception, and modern science, by absolutizing its idealized nature, was unable to acknowledge this, and, thus, to make intelligible the sense of being of its own object of investigation and the legitimacy of its procedure. There is nothing new in this respect. But the life-world is also the ground of the cultural formations belonging to the spiritual world, and, most of all, of the specific cultural formations of philosophy and science: it is intersubjective and spiritualized; it is a world of personal subjects engaged in praxes governed by values. The blindness to the world of spirit, resulting from the blindness to the life-world, made it impossible to see that the subjectivity constituting the nature of modern science is a spiritual, personal subjectivity that is unified in a nexus of personal relations. It has been impossible to acknowledge, not that the science of nature is a spiritual formation, as Husserl says in the preliminary, non-conclusive critical remarks against the prevailing scientific attitude, but that *the nature correlated to it is a spiritual formation*. Once transcendental phenomenology has clarified the absurdity of the psychophysical worldview, once it has reestablished the sense of psychological being as a unitary self-enclosed domain of being, then the defeat of naturalism

is complete, because the asymmetry between nature and spirit appears evident:

*The spirit, and indeed only the spirit, exists in itself and for itself, is self-sufficient; and in its self-sufficiency, and only in this way, it can be treated truly rationally, truly and from the ground up scientifically.* As for nature, however, in its natural-scientific truth, it is only apparently self-sufficient and can only apparently be brought by itself to rational knowledge in the natural sciences. For true nature in the sense of natural science is a product of the spirit that investigates nature and thus presupposes the science of the spirit.<sup>34</sup>

The universality of the absolute spirit surrounds everything that exists with an absolute historicity, to which nature is subordinated as a spiritual structure.<sup>35</sup>

This is why there will never be a physics of history, but there is and there must be a history of physics, that is, a humanistic science that takes as its object the way in which personal subjects, in the unity of scientific tradition, have brought about that cultural formation. And “beneath” all humanistic sciences of the world, we find the eidetic science of spirit conceived as constitutive, as subjective pole of the correlation with all real being. Now, transcendental phenomenology appears as the ultimate science of spirit *qua* unitary intersubjective nexus bearing within itself nature as a constitutive historical formation.

In the absence of this new science, the very idea of a teleology of reason loses any sense and philosophy inevitably succumbs to objectivism, and so does the ideal of a genuine rationalism that can guide European civilization. In a few words, in the last part of the *Vienna Lecture*, the crisis of European humanity is finally identified as “an apparent failure of rationalism.”<sup>36</sup> In contrast to *Krisis I*, the point of departure of this text is the crisis of European culture as a whole. The quest for its causes has led to the identification of the crisis of philosophy and of the special sciences. But apart from this inessential difference in exposition, the interest for us of this text is that it has given not only a first anticipation of the cause of the failure of modern rationalism, it has also recast the whole problematic of the relation between material nature and constituting subjectivity in terms of spirit. In this respect, however, the *Vienna Lecture* has a fundamental shortcoming. While the notion of spirit is initially introduced in relation to the positive humanistic sciences, it eventually appears as the absolute field of transcendental phenomenology. In the first of the last two quotations, indeed, it is characterized in a way that, at bottom, recapitulates and extends the description of pure consciousness in the “Consideration Fundamental to Phenomenology.” In short, whereas the exposition initially seems to focus on what, in a phenomenological sense, is *objective spirit*, the

conclusion makes a sudden leap to *absolute spirit*. Since the notion of spirit and its relation to nature play a fundamental role in the internal development of the *Krisis*, this gap needs to be filled out. Thus, the remaining sections of this chapter will have the following structure. I will first provide a detailed analysis of the Galileo section contained in *Krisis II*. Subsequently, after a brief reconsideration of the misunderstandings deriving from the philosophy of science, I will, drawing largely on the third part of *Ideas II* and on different texts on the life-world, clarify the relations between the natural sciences based on the naturalistic attitude, the positive sciences of objective spirit based on the personalistic attitude, and the science of absolute spirit based on the transcendental attitude. In light of this, I will then reinterpret the Galileo section and its significance for the transcendental theory of nature, and, finally, reconsider the idea of the crisis of philosophy.

### §3. The Idea of Philosophy and the Origin of the Mathematical Science of Nature

A text presumably written in 1936 and included as an appendix to the *Krisis* bearing the title *Objectivity and the World of Experience* is the right place to begin analyzing Husserl's famous discussion of Galileo's mathematization of nature, and to do so in a way that highlights its continuity with *Ideas II*. This short text sketches the a priori historical reconstruction of the origin of physics in a way more akin to the style of the *Origin of Geometry* and, thus, more purely exempt from historical contingency than what we can read in the second section of the *Krisis*.

The starting point of this appendix is the life-world, which is referred to as the "everyday common world"<sup>37</sup> or "experiential world,"<sup>38</sup> in which our practical and prescientific life takes place and in which things stand out as identifiable identity poles against the "Heraclitean flux" of experience. Each object stands, as Husserl often repeats, in a horizon that is both internal and external: each of its properties admits of possible closer determinations, and, at the same time, refers to the "infinity of unknown things, things of possible experiential knowledge."<sup>39</sup> In the unity of the life-worldly properties that present themselves in this movement of approximate knowledge, the apprehension of causality also takes place along the same modalities:

To these also correspond, as belonging to the vague things, horizons of causalities which are also only vague; these, insofar as they have become known determinately through experience, are related to the circumstances and changes in circumstances which are experienced with approximate determinateness and have, in addition, their horizon of as yet fully undetermined causalities, related to the horizon of unfamiliar external things.<sup>40</sup>

This passage evokes the experiential character of the thing as *res materialis*, along with its horizontal structure. As we have seen while discussing the constitutive analyses presented in *Ideas II*, it belongs to the essence of a thing to be more than a sensuous scheme or even a changeable phantom, for a thing consists in the higher unity that announces itself in the ordered flux of sensuous schemes functionally dependent upon regulated changing circumstances. This holds both for what science calls mechanical properties, such as elasticity, flexibility, and the like, which are constituted by virtue of the coherent modification of spatial and temporal determinations, and for properties filling the spatiotemporal skeleton of things, such as colors, temperatures, sounds etc. In the *Krisis*, Husserl famously names the latter “sensible *plena*.” This causal horizon, too, can be more or less familiar insofar as our ability to anticipate the causal behaviors of things is always based on a limited acquaintance with them. We all know what happens if we toss a wooden post into a fire, but one might well ignore what transformations it undergoes by being buried for decades under the mud. In this case, the “unfamiliar external things” Husserl refers to is a large amount of mud in which no oxygen can penetrate: this is something that belongs to the causal horizon of a wooden post. Thus, the entire ramified structure of the horizons implied in thing-experience corresponds to the fundamentally inductive character of our experiential life, from its prescientific stage onward. Any aspect of practical life can follow its course in the life-world precisely based on this ever-present inductive anticipation, whereby the sense grasped by an act of perception transcends what is actually given in it. Let us stress once more the extent to which causal properties belong to the very essence of what we apperceive as “things.” Indeed, the constitution of causality is not something that is added to the thing constitution as a further external layer: we do not first constitute a world of things and then a network of causal relations woven into it; rather, causal properties belong precisely to the original apprehension of things *as things*. When I perceive a glass surface, I also apperceive its character of fragility in virtue of the habitualities belonging to the flow of my own experience, to the history of my own subjectivity. Only abstractively, only suspending the, so to speak, “genetic legacy” of past experience, can I focus on the static appearance of a glass surface and claim that its mere sensible scheme does not reveal by itself the property of fragility. Thus, to each thing-apprehension there belongs an inductivity that concerns not only the sides of thing or the properties that are not actually perceivable, not only the more detailed structure revealing itself upon closer inspection, but also the general and vague anticipation of its behavior in relation to vaguely defined changes in causal circumstances. In this sense, the subject *qua* substrate of habitualities, i.e., by

virtue of an ongoing genesis, carries with it the entire world as a unitary fabric of inductivity.

Husserl, in this text, briefly mentions the fact that this world of everyday experience is one of normal subjects whose lives are “related to a sphere of normal things which become known to them in common through a set of normal types of experience.”<sup>41</sup> The notion of normality is essential to the constitution of the everyday world of experience, a theme that is here only touched upon. The main reason to introduce the notion of perceptual normality is, however, always the same, namely, to introduce the task of moving *beyond* the relativities involved in it and, most of all, the contingency affecting it.

But given this inalterable style of our experiential world – the world we constantly have in life as the world of actual experience, which gives to the word “world” its sole original sense – how is scientific knowledge of the world, “philosophy” in the language of the ancients, possible? Indeed, how can it even be motivated as a task, and specifically with that sense of scientific objectivity which has come to be taken completely for granted by us, a sense that had first to be formed in the development and transformation of the original world-concept?<sup>42</sup>

The *Vienna Lecture* gives an answer to the second question contained in this passage, an answer that this text only briefly recapitulates mentioning the relative character of prescientific knowledge, *doxa*, and the task of overcoming *doxa* to attain knowledge proper, *episteme*, i.e., to which there corresponds “a rationally knowable in itself,”<sup>43</sup> an irrelative in itself graspable only in the movement of changing appearances. The first question, instead, contains two claims worthy of attention: (1) notwithstanding its subjective-relative character, the life-world of everyday experience is the one that “gives the word ‘world’ its sole original sense.” (2) Philosophy in the old sense, as universal science of everything that is at all,<sup>44</sup> is “scientific knowledge of the world,” of the world the original meaning of which is fixed in prescientific experience. As we shall see, these apparently innocent statements are of fundamental importance to understand the sense of Husserl’s critique of Galileo’s mathematization of nature. The world of science, but also all practical, professional, and social worlds can legitimately be called worlds only because they are different declinations of the one original world manifesting itself in experience. Their identity-otherness with respect to the life-world is precisely what will be necessary to understand. The objectivation of this world of experience is what is in question here, and this is a task that requires a method, the method of idealization, which does not “produce things out of other things in the manner of handwork;

it produces ideas.”<sup>45</sup> The objectivation of the world through idealization is thus the theoretical performance that overcomes the subjective-relative character of the life-world. The possibility of the objectivation of the world is the theme of the phenomenologist’s regressive inquiry,<sup>46</sup> and, more particularly, the part of this objectivation that in fact our culture has succeeded in carrying out, namely, in geometry and in the mathematical science of nature. The latter achieves the transformation of the prescientific causal inductivity characterizing prescientific life into the scientific inductivity based on exact causality.<sup>47</sup> The following two passages outline the program that Husserl partly realized in the *Origin of Geometry* and in the *Krisis II* and clarify in an exemplary manner how *the regressive inquiry into the origin of mathematics and physics is ultimately part of a general reflection on the origin, essence, and destiny of philosophy itself.*

The problem which is thus formulated in general terms is the radical *problem of the historical possibility of “objective” science*, objectively scientific philosophy – the science which, after all, has long been present, in its way, as a historical fact, which developed through the appropriation of the above idea of its task, and which has attained, at least in one branch, a supremely fruitful realization, namely, as exact mathematics and mathematical natural science.<sup>48</sup>

Geometry and the other sciences related to it are ultimately all either actual or still to be accomplished branches of the one philosophy, which is supposed to be an accomplishment of theoretical mankind, philosophizing mankind, and that their goal is truth – not everyday finite truth, whose limitedness, whose finitude, whose relativity consists in the fact that it is historical but keeps the historical horizon in the dark. There is to be an unconditioned, absolute truth, encompassing the world, including man who lives in it, with his practical interests, his relative knowledge, and the valuations and projects based on it; and also philosophizing man, with his philosophical truth-structures.<sup>49</sup>

This is what must be kept in mind when discussing the famous section of the *Krisis* devoted to Galileo. The aim of Husserl is to discuss the origin of physics, which we have characterized as the part of philosophy the aim of which is to discover the truth in itself corresponding to material nature, i.e., to become the *episteme* of material nature. In the next sections, I will reconstruct the original indebtedness of physics to the idea of philosophy as the universal science of what exists, the development of geometry as the *episteme* of the abstract ideal forms, and, finally, how physics ultimately lost the sense that it bore in itself from its original establishment.

#### §4. The Background of Galileo's Mathematization of Nature: The New Scientific Ideal

The idea of philosophy, or universal science of what is, was born in Greece and constitutes the primal establishment of European culture.<sup>50</sup> Husserl, though, situates a deep transformation of its sense at the time of the Renaissance, when the idea is taken up again after the end of the Middle Ages. As mathematics was the one discipline in which the ancient ideal of science had achieved the greatest success, it is unsurprising that the new ideal of science was brought about by a reform of mathematics itself. Husserl characterizes this reform in an important passage that looks at first sight quite puzzling:

Euclidean geometry, and ancient mathematics in general, knows only finite tasks, a finitely closed a priori. Aristotelian syllogistics belongs here also, as an a priori which takes precedence over all others. Antiquity goes this far, but never far enough to grasp the possibility of the infinite task which, for us, is linked as a matter of course with the concept of geometrical space and with the concept of geometry as the science belonging to it.<sup>51</sup>

This passage seems to be in sharp contradiction with the claim made in the *Vienna Lecture*, namely, that the specificity of Greek culture consisted in the invention of the theoretical attitude and that this attitude disclosed for the first time a form of historicity characterized by the striving for infinite tasks. How is it, then, that the ancient science, in its material-ideal mathematical disciplines (Euclid) and in its formal-logical ones (Aristotle), knew only finite tasks? In order to remove the contradiction, one has to presume that the words finite/infinite do not mean exactly the same in the two texts, and that, once this is taken into account, it is possible to understand how the Greek idea of philosophy/science contains an element of finitude *internal* to its theoretical development that is not at odds with the attitude underlying it.

What, then, is the specific contribution of the new idea of science, the one destined to shape modernity, to guide the rise of rationalism as well as to cripple its very foundations? The following part of §8 of the *Krisis* explains it in regards to the paradigmatic case of geometry.

To ideal space belongs, for us, a universal, systematically coherent a priori, an infinite, and yet – in spite of its infinity – self-enclosed, coherent systematic theory which, proceeding from axiomatic concepts and propositions, permits the deductively univocal construction of any conceivable shape which can be drawn in space. What “exists” ideally in geometric space is univocally decided, in all its



determinations, in advance. Our apodictic thinking, proceeding step-wise to infinity through concepts, propositions, inferences, proofs, only “discovers” what is already there, what in itself already exists in truth. What is new, unprecedented, is the conceiving of this idea of a rational infinite totality of being with a rational science systematically mastering it. An infinite world, here a world of idealities, is conceived, not as one whose objects become accessible to our knowledge singly, imperfectly, and as it were accidentally, but as one which is attained by a rational, systematically coherent method. In the infinite progression of this method, every object is ultimately attained according to its full being-in-itself [*nach seinem vollen An-sich-sein*].<sup>52</sup>

Insofar as Greek geometry was a science, surely it could discover an unlimited number of true propositions, which furthermore, being ideal in character, admit of an infinite process of verification. In other words, it set for itself an infinite task in the sense specified in the *Vienna Lecture*. It is unlikely, to say the least, that Husserl, against his own general account of science, is now denying this feature to Greek geometry. By contrast, only modern geometry, as Husserl adds in the *Krisis*, sets the goal of mastering geometrical space as a sort of environment in which an infinite number of ideal formations are determinable in principle through a unitary method. Each form that can be (ideally) drawn in such space, each “geometrical figure,” counts as a “thing” situated in this environment. The analogy with the world that Husserl suggests is spontaneous. The world of experience, i.e., the arch-world that can never degrade to just one among many, is a world of things and processes involving things, which are known “singly, imperfectly, and as it were accidentally.” Such things are encountered in the world and known from within the world, from a certain perspective. In contrast, the inhabitants of the ideal world of geometry are all a priori knowable, not imperfectly or under a perspective, but in their intrinsic being, by means of a rational insight based on a close system of axiomatic a priori truths. A method guarantees the a priori accessibility of its being in itself. The new idea of “of a rational infinite totality of being with a rational science systematically mastering it,” sets scientific tasks that are infinite in a new sense: not only the infinity of the truths pertaining to the domain of a science and the infinity of their verification built on an axiomatic system, but also the quest for theories, for sets of axiomatic concepts and propositions making possible the a priori coherent construction of an infinite multiplicity of conceivable beings. To be sure, the modern era sets this ideal, an ideal the actual realization of which will require the effort of generations. But this new ideal is infinite in a new, stronger sense. A fortiori, the ancients could not conceive of the idea of a purely formal mathematics, a formal *mathesis*, the methodically a priori determinable objects of which are “objects in general.”<sup>53</sup> This *mathesis* is infinite in this new sense and establishes a rational infinite

domain not of spatiotemporal forms but of forms-of-objects in general. Now, Husserl is persuaded that this new idea of science “soon overtakes natural science and creates for it the completely new idea of mathematical natural science – Galilean science, as it was rightly called for a long time.”<sup>54</sup> And he adds, “as soon as the latter begins to move toward successful realization, the idea of philosophy in general (as the science of the universe, of all that is) is transformed.”<sup>55</sup>

We know that the determination of material nature as a mathematical manifold constitutes the final stage of its transcendental constitution, the one carried out in the theoretical accomplishments of mathematical physics. In the *Krisis*, Galileo appears as the initiator of this method of objectivizing nature. The critical tone of the famous section on Galileo may give the impression that what Husserl at the time of *Ideas* conceived as the legitimate crowning accomplishment of the constituting subject has now become, in his eyes, a fatal mistake deriving from scientists’ *objectivism*. The reading here presented will try to show that this impression is totally wrong and that Husserl has not modified his opinions on these issues.

The gulf existing between ancient and modern science is reasserted at the beginning of §9 of the *Krisis*, where Husserl opposes two different ways of relating the real and the ideal, and, in particular, the material objects and the mathematical idealities of geometry. This difference between antiquity and modernity is spelled out by means of the opposition between two names: Plato and Galileo. According to Plato, the great initiator of the Western notion of ideality, real objects could have “only a more or less perfect *methexis* in the ideal.”<sup>56</sup> Particulars never perfectly exemplify the “forms” (the *eide*) under which they are subsumed. Whether these forms correspond to moral and aesthetic values, to species and genera of objects, or to geometrical shapes, they remain by necessity *unattainable* by particulars and enjoy ontological priority over them. “The world of the senses is for him a world of illusions [*Scheinwelt*] and not a world of appearances [*Erscheinungswelt*], that is the subjectively variable appearance of a true world.”<sup>57</sup> The style of scientific inquiry characterizing modern European humanity breaks with this tradition in an essential way, because, as we know, nature itself is replaced with a definite mathematical manifold. In a word, this transformation, according to Husserl, is Galileo’s standing achievement: “Through Galileo’s mathematization of nature, nature itself is idealized under the guidance of the new mathematics; nature itself becomes – to express it in a modern way – a mathematical manifold [*Mannigfaltigkeit*].”<sup>58</sup> After Galileo, therefore, what is real, say, the shape of a specific thing, *as it is in itself*, does perfectly instantiate a geometrical *eidos*, although in practice, as it is given to us in perception and in measurement, it will only do so approximately. In a word, the real and the ideal merge at the level of the in-itself lying beyond subjective-relative appearances.

For a correct understanding of Galileo's mathematization of nature, it is vital to keep in mind that it consists in nothing less than another chapter in the development of the *theoria* initiated by the Greeks. We know, therefore, that the *telos* inborn in physics is to overcome the subjective-relative character of prescientific experience and determine material objects and processes in such a way that they are the same for everyone. We also know that, in spite of the subjective discrepancies of perceptive thing-apprehension, the same objects and the same world are given to us all. The same X, to speak in the language of *Ideas II*, is perceived differently by different subjects, and, thus, the problem becomes that of filling *into this X* an objective content: the real thing, the truth-in-itself of *theoria*. As Husserl already explained in §18d of *Ideas II*, we cannot limit ourselves to postulate the existence of such X without any specific content:

Have we nothing more than the empty, necessary idea of things which exist objectively in themselves? Is there not in the appearances themselves a content we must ascribe to true nature? Surely this includes everything which pure geometry, and in general the mathematics of the pure form of space-time, teaches us, with the self-evidence of absolute, universal validity, about the pure shapes it can construct *idealiter* – and here I am describing, without taking a position, what was “obvious” to Galileo and motivated his thinking.<sup>59</sup>

This motivating “obviousness” was, nonetheless, to revert to the language of Husserl's theory of science, the crucial insight that made it possible for physics to become a progressive science, viz., the core of the idea of a material eidetic theory of nature, which we have discussed at length. Admittedly, this passage does not help the reader connect the problematics of the *Krisis* to Husserl's earlier analyses of mathematical physics or, more specifically, to the theme of the a priori ontology of nature that, as we know, comprises sciences such as geometry, chronometry, kinematics, and also (in principle) rational dynamics. However, one can find a terminological bridge with Husserl's earlier analyses in a text that, according to Walter Biemel, was written before 1928, and that has been added as an appendix to the *Krisis, Idealization and the Science of Reality*. In this text, Husserl begins with a characterization of science and philosophy as initiated by the Greeks,<sup>60</sup> from which he argues that a necessary step towards the fulfillment of this ideal in regards to nature consists in developing disciplines of the pure idea of nature, among which he ranks, as usual, geometry, phronomy, and a priori mechanics.<sup>61</sup> Their task is precisely to single out what pertains a priori to nature as it is in itself.<sup>62</sup> However, in *Krisis II*, due to the style of its historical considerations, Husserl is after the reconstruction of the motivational nexus that brought about modern physics, and he does not provide a phenomenological elucidation of the

naturalistic attitude, as he had attempted, instead, in *Ideas II*. For this reason, in the *Krisis*, he does not emphasize the link between what was so “obvious” for Galileo and the foundational theme of the ontology of nature. It is nevertheless important to keep in mind that each step of the Galileo section mirrors Husserl’s own understanding of what truly makes up the rationality and scientific maturity of modern physics, starting with its rootedness in the mathematical a priori ontology of nature. In order to follow Husserl’s own train of thought, it will be necessary, furthermore, to supplement the reading of §9a of the *Krisis* with some passages from the *Origin of Geometry*. This will help to delineate the “obviousness” of geometry and what was wrong with it.<sup>63</sup>

### §5. Pure Geometry (*Krisis* §9a)

Geometry (or the pure mathematics of spatiotemporal shapes<sup>64</sup>) is, according to Husserl, a part of the a priori ontology of nature, henceforth literally a part of physics itself. However, it is also the sense-foundation (“*Sinnesfundament*”) for modern exact physics as a whole,<sup>65</sup> for, as we know, the mathematization of nature that founds modern physics is, at bottom, a *geometrization of nature*. Furthermore, the geometrization of nature is an idealization of nature, because geometry is a discipline dealing with ideal space and figures.

At the beginning of §9a, Husserl reminds us once more that we tend to forget the essential difference between the intuitive shapes of perception and the exact shapes of geometry. This difference does not admit of degrees and involves a sharp leap. No matter how much we exercise our imagination in varying the shapes of our surrounding world, we will always obtain vague intuitive forms to which only an “empirical genus” correspond,<sup>66</sup> not exact essences.<sup>67</sup> Presumably, each culture has words to indicate such genera as “round,” “curved,” “straight,” which are necessary for our everyday praxis. These intuitive shapes “fade into each other as a continuum”<sup>68</sup> and remain at the level of the typical or the *morphological*. Conversely, there is no way to accomplish an intuitive process of variation in which we would witness the vague-morphological and the exact-ideal to “fade into each other as a continuum,” because the former is graspable in perception and imagination only, while the latter, as Husserl stressed already in *Ideas I*, is an idea in the Kantian sense. The leap in question is thus grounded, as all fundamental (in a broad sense, “regional”) differences are, in the eidetic difference between two forms of sense-giving consciousness. What is needed is a process whereby, out of what can be given in intuition, there results an idea, i.e., a process of idea production:

Logical signification is exact. The logically general, the concept, is absolutely identical with itself, and subsumption is absolutely

unambiguous. But logical concepts are not concepts taken from what is simply intuitive; they arise through a rational activity proper to them, the development of ideas, *exact* development of concepts, e.g., through that sort of idealization which produces, out of the empirically straight and curved, the geometrical straight line and circle.<sup>69</sup>

The idealities that characterize European culture *must have* originated through such a process of idealization, or, in other words, they must contain in themselves the intentional reference to their historical origin in the world of intuition in which our prescientific praxis takes place: *and we can know it a priori with respect to our empirical knowledge of history*. The problem is how mathematical exactness can result out of the vague and contextual prescientific spatial determinations. The key to solve this problem lies in the fact that such determinations admit of constant *improvement*. Husserl famously mentions examples suggested by manual activities, such as making “the straight straighter and the flat flatter.”<sup>70</sup> The idea is that the morphological determinations of prescientific life are relative to practical needs: the legs of a table are “equal” when the table doesn’t wobble, the wheel is “round” if it turns smoothly on the ground, etc. However, the application of these predicates requires criteria that depend on the practical needs motivating these activities. Thus, in prescientific life, objects are not equal in themselves, they are not straight or curved in themselves; they are equal or straight or curved only with respect to certain practical contexts that determine a level of relative *perfection* of the predicate in question.<sup>71</sup> This fact indicates that the subjective-relative character of the life-world depends not only on perceptual discrepancies among subjects, but also on the fact that the description of reality is affected by a perspectival character rooted in life’s contextual practical orientation. For this reason, not only to different cultures do there correspond different surrounding worlds, but also, within the same culture, the world of the trader is different from the world of the peasant, or the world of the artisan, etc.<sup>72</sup> It is important to stress that no such broadened notion of “subjective-relative” could have been introduced in the section of *Ideas II* dealing with the constitution of nature, where, indeed, only perceptual discrepancies were in question. This is because, as we know, the attitude adopted there was the naturalistic, which suspends all practical and cultural values. The notion of “subjective-relative” in question there was the one someone like a Helmholtz could be interested in.

This idea of perfection, in turn, as technology progresses, as practical needs evolve, etc., advances in an ideally open progression.

We can understand that out of the praxis of perfecting, of freely pressing towards the horizons of *conceivable* perfecting “again and again,” *limit-shapes* emerge towards which the particular series of

perfectings tend, as toward invariant and never attainable poles. If we are interested in these ideal shapes and are consistently engaged in determining them and in constructing new ones out of those already determined, we are “geometers.”<sup>73</sup>

Thus, in a few words, Husserl takes us from the world of prescientific praxis to the ideal praxis of geometry, which deals with ideas, with objects of pure thought nowhere to be found in the world of perception. Yet, this exposition is still provisional and suffers from two limitations.

First, the creation of geometrical idealities is a multi-layered process that, from the first appearance in the mind of the proto-geometers, requires an increasing level of communalization and thus objectivation of the ideal itself. A few lines later, Husserl hints at this process by evoking the transformations of geometrical concepts into shared “cultural acquisitions”<sup>74</sup> that, in virtue of their sedimentation in the “sensible embodiment” (*sinnlicher Verkörperung*<sup>75</sup>) of speech and writing, can be grasped by everyone, without any need to repeat the process of idealization. However, only the *Origin of Geometry* details the role of this process for the very establishment of geometry as a scientific tradition. We can sum up the supplementary indications concerning the origin of idealities that we find in that text in the following way. Husserl distinguishes between three different stages that culminate in the creation of the ideal objectivities of geometry. The first stage is *intra-subjective* and consists in the appearance of geometric notions “within the conscious space of the first inventor’s soul”<sup>76</sup> and their expression in linguistic formations. At this stage, it is possible for the first inventor to reawaken these formations and produce the “self-evidence of identity”<sup>77</sup> with what was earlier conceived; but this does not confer any real objectivity to the ideal formation. The first level of objectivity is achieved at the *intersubjective stage* based on empathy and on mutual linguistic understanding. This time the self-evidence of identity concerns not only the temporal repetition of the original evidence in the individual’s consciousness, but also the communicative nexus of different subjects (“What is self-evident turns up as the same in the consciousness of the other.”<sup>78</sup>) Let us stress that, at this time, the ideal formations of geometry are not “present” in a multiplicity of consciousnesses but identically the same for them all. However, even this second “oral” level does not make possible the reactivation of geometrical notions beyond a given temporally limited community. Only by fixing these notions in written language does their objectivity cease to be limited by the existence of direct communicative exchange. This first and final stage assures ultimate objectivity to geometrical idealities. With written language, communication becomes virtual,<sup>79</sup> the geometry can become a scientific tradition addressing an ideally open, intergenerational community. At this level, Husserl speaks of a real sedimentation of geometrical idealities in written language, which amounts to “a transformation of the

original mode of being of the meaning-structure.”<sup>80</sup> We will come back later to the dangers that this sedimentation implies. For the moment, let us return to the internal development, and specifically the two limitations, of §9.

Second, this sketchy account of idealization seems to suggest that geometrical idealities can arise out of a change of “interest”<sup>81</sup> (in this passage, the peculiar interest of geometers implies the adoption of the theoretical attitude and thus the “epoché” from any practical interest) taking place against the backdrop of technical activities such as carpentry or shipbuilding. In the following paragraphs, however, Husserl adds that any practical activity, in order to lead to a process of idealization through such changes of interest, must involve the *art of measurement* (“*Messkunst*”), and that only the progressive improvement of such an art sets the conditions for the conceptual leap to mathematical exactness. In order to explain this important point, Husserl stresses that geometers do not progressively enrich the universe of exact and univocally determinable geometrical entities by applying a uniform method to any empirical shape whatever, which “could carry out idealization everywhere and originally create, in objective and univocal determinateness, the pure idealities which correspond to them.”<sup>82</sup> This would require a constant “flow” from empirical genera of shapes into the exact *eide* of geometry, whereby the creation of ideality would take place over and over again in an endlessly repeated creation of limit-shapes. Indeed, the infinite variety of prescientific morphological shape-concepts does not even admit of such a treatment. If they undergo a transformation into scientific concepts, they do so in the context of *morphological sciences only*, which, as we know, necessarily avail themselves of morphological *eide*. So, how is it possible to assure the exact determination of shapes and of their properties for an ideally open universe of geometrical entities?

For this, [rather], *certain structures stand out*, such as straight lines, triangles, circles. But it is possible – *and this was the discovery which created geometry* – using these elementary shapes, singled out in advance as universally available, and according to universal operations which can be carried out with them, to *construct* not only more and more shapes which, because of the method which produces them, are intersubjectively and univocally determined. For in the end the possibility emerges of producing constructively and univocally, through an a priori, all-encompassing systematic method, *all possibly conceivable* shapes.<sup>83</sup>

Geometry thus requires a methodology of compositionality of the fundamental structures obtained through idealization, which makes possible an *internal*, so to speak, generative unity of the world of geometry, assigning to us the impossible task of repeating the idealization process for each

new morphological type of shape. *This methodology is what points back to the art of measurement*, of which land survey (“*Feldmesskunst*”<sup>84</sup>) constitutes a paradigmatic case. Measurement, particularly as applied to distances and shapes, is an activity that characterizes already prescientific life in different degrees of perfection. Its aim is already one of *objectivation*, for it permits the attribution to empirical shapes of determinations that are communicable also to “every other one who does not at the same time factually see it.”<sup>85</sup> What is required for this technique is (1) the creation of a vast number of morphological concepts to describe the different kinds of shapes, magnitudes, relations of positions, angles, etc., and (2) the individuation of empirical basic shapes (“*empirische Grundgestalten*”<sup>86</sup>) that, being fixed to rigid bodies, can be used as shared standards of measurement. Husserl, of course, has in mind tools such as the ruler or the set square, i.e., instruments that make possible the (approximate) decomposition of empirical shapes into more fundamental components allowing their determination. It is now clear that the essential precondition for the birth of geometry is not, by itself, the practice of perfecting objects into better versions of themselves, but the art of measurement, along with its concepts, its tools, and its prescientific quantitative determinations. By virtue of this change of attitude, which marks the rise of the philosophical interest for objective truth-in-itself, *the art of measurement itself was idealized, not merely concepts such as the straight and the round*, and this gave birth to pure geometry.<sup>87</sup>

This account of the origin of geometry, while extremely clear and convincing, does seem to be at odds with Husserl’s claim that there is an essential difference between ancient and modern mathematics. Indeed, from the last long quotation it would seem that precisely what he has characterized as the infinite task of constructively determining all conceivable shapes in their being-in-itself was already a defining trait of Greek geometry (“*and this was the discovery which created geometry*”). Of course, this is too important a point to imagine that Husserl was hesitant about it. What is more likely is that Husserl sees in ancient geometry the discovery of an internal compositionality of the world of idealities that would have *eventually* (meaning at the dawn of modernity) led to a method of determining a priori, in contrast with what happened in the ancient world, all conceivable geometric shapes. In this way, we would also confirm that the idea of *definite manifold* is characteristic of modernity. As we have seen, Husserl’s characterization of the infinity of the scientific task presents some interpretative problems. In light of this analysis, a possible overall interpretation can be formulated as follows. (1) The infinity of the scientific task as characterized in the *Vienna Lecture* (in both extensive and intensive senses) belongs to both ancient and modern science and thus, in particular, to ancient and modern geometry alike. (2) The internal compositionality of spatial figures is a feature of the art of measurement carried over in the process of idealization and essential



to geometry, both ancient and modern, as well as to the infinity of its task in the sense of the *Vienna Lecture*. (3) However, the infinity of ancient geometry remains, so to speak, a *potential infinity*: methods are devised to determine more and more shapes. In contrast, modern geometry set itself a goal characterized, again, so to speak, by an *actual infinity*, i.e., an infinite field of geometrical shapes mastered in advance by means of a unitary method.

At any rate, §9a of the *Krisis* presents an extraordinary account of the (deep) roots of the concept of definite manifold in the life-world and, by extension, a wonderful example of how, according to Husserl, the highest formations of rationality, of *episteme*, derive from prescientific doxastic activities. The methodic determination of shapes based on a limited number of basic shapes practiced by ancient surveyors prefigures, in the sphere of praxis, the ideal unity of a deductive system based on a limited number of axiomatic concepts and truths.

## §6. The Mathematization of Sensible “Plena” (*Krisis* §§9b–9e)

As is well known, in Husserl’s reconstruction of the history of European thought, Galileo and Descartes are the two key figures, identified as the founder of modern science and of modern philosophy respectively. This way of characterizing their life’s work, however, should not divert our attention from what really matters, namely, that Husserl’s intention is to characterize the role they played in the one historical unfolding of *the philosophical rationality inaugurated by the Greeks*, which is the real theme of his considerations. (Not to mention that Galileo also wrote texts deeply philosophical in character while Descartes also wrote texts that were unequivocally scientific in character.) Such considerations project back in time our own contemporary conception of science and philosophy as two different, although highly interconnected endeavors, a conception that is itself the (unfortunate) result of the past vicissitudes of *episteme* that Husserl is trying to disclose. One must keep in mind the fact that Galileo and Descartes were both philosophers in the sense specified previously and that their difference resides in the fact that Galileo was motivated by a philosophical interest directed preeminently at material nature, whereas Descartes aimed at a foundation of the totality of philosophy, starting with its method.<sup>88</sup>

After the revival of the ancient ideal of philosophy during the Renaissance (a revival to which, admittedly, Husserl refers in rather vague terms), Galileo appears as the heir of a geometrical tradition that has developed itself along two different directions, the mutual interplay of which deserves careful attention. We have analyzed the first direction in the previous section: geometry as a pure science of idealities. As such, its object is an objective “ideal world” of exact shapes. Husserl indeed

claims, “out of the undetermined universal form of the life-world,” mathematics “made for the first time an objective world in the true sense,” that is, “an infinite totality of ideal objects which are determinable univocally, methodically, and quite universally for everyone.”<sup>89</sup>

Nonetheless, Husserl would also add that the object-domain of pure geometry is “a world” only *latu sensu*. To be sure, geometrical idealities are “objects” in the broad (formal-ontological) sense of the word, and they are identical substrates of properties and relations. Yet, such a domain of objects is not endowed with the *structure of individuation* essentially belonging to the *real world*, to what Husserl, as have I have already stressed, calls “the world of actual experience, which gives to the word ‘world’ its sole original sense.”<sup>90</sup> Let us recall that experience (“*Erfahrung*”) is the intuition of *individual objects*, in this case, precisely the spatiotemporal things of our surrounding world. The intentional correlates of sensuous experience are objects that receive an individuation in the causal spatiotemporal nexus by virtue of their situatedness with respect to our living body, and this is what ultimately gives a meaning to indexical terms such as “this” and “that.”<sup>91</sup> The thus individuated objects of experience are subsumed under morphological empirical types, which are, in turn, new, different kinds of objects. This duality between real-individual and general types is a fundamental structure of the world of experience. The inhabitants of the “geometrical world” do not mirror in any way such a fundamental structure, for the simple reason that, no matter how particularized they might become, geometrical entities always remain general ideal types, ideas in the Kantian sense, and, as Husserl says, they cannot be “seen.”<sup>92</sup> Husserl’s account of idealization helps us understand why. Geometrical idealities are the result of a process of idealization that operates on a series of shapes already considered *morphological species*, not properties of individual objects. The concepts, and only the concepts, of the art of measurement are idealized into those of geometry: the limit-shapes of geometry are ideal limits of morphological shapes, while the reference to individual objects has been dropped from the outset. Thus, in the claim that the world of geometry is the historically first “objective world in the true sense,” the term that should take precedence is “objective,” not “world.” The *domain* of geometry is *objective*, but it is not a *world*; rather, it expresses the general spatiotemporal form of infinite possible worlds, because the idealization leading to it can be carried out at a level that is already general and emptied of the life-worldly reference to the *hic et nunc*. In conclusion, the first objective world mentioned here must be understood as the *first objective scientific domain*, the first domain of truth in itself substructured over the life-world and laying beyond the reach of intuition. As an enclosed domain, furthermore, it is endowed with the aforementioned internal generativity, which eliminates the need for a

constant recourse to experience. Correlatively, to this domain, there corresponds the transformation of the life-world resulting from the birth of a *scientific tradition* based on writing.

The second direction in which ancient geometry developed up until the age of Galileo consists in the application of geometry to the art of measurement, which introduced a decisive novelty precisely with respect to the relation between geometrical knowledge and the real world.

Coming into contact with the art of measuring and then guiding it, mathematics – thereby descending again from the world of idealities to the empirically intuited world – showed that one can universally obtain objectively true knowledge of a completely new sort about the things of the intuitively actual world, in respect to that aspect of them (which all things necessarily share) which alone interests the mathematics of shapes i.e., a [type of] knowledge related in an approximating fashion to its own idealities.<sup>93</sup>

The technique of measurement guided by geometrical idealities is completely different from the proto-scientific survey from which geometry originated. The new scientific tradition modifies the sense of the old pre-scientific tradition of measurement. Idealities now intervene for the first time, and they do so not only in the creation of methods of measurement, because they also essentially modify the sense of the results they yield. These now appear, for the first time, as approximations to ideal poles never obtainable in practice. Consequently, geometrical knowledge contributes to a *new kind of objectivation* of the intuitive world. At the beginning of §9b, Husserl mentions that Galileo inherited a geometry already applied “not only to the earth but also in astronomy.”<sup>94</sup> Measurements such as that of Eratosthenes or the complex determination of the movements of the asters perfectly epitomize this kind of activity, in which measurement can also be brought to the service of the theoretical attitude in order to produce objectively valid determinations of the world of experience. This opens up, Husserl claims, the possibility of “a completely new kind of inductive prediction.”<sup>95</sup> This reference to a methodic form of induction is extremely important. Geometric knowledge, by extending our inductive capacities and by anticipating the experiential disclosure of the world-horizons, partakes in the knowledge of the real, one could say, in the constitution of the world.

One can “calculate” with compelling necessity, on the basis of given and measured events involving shapes, events which are unknown and were never accessible to direct measurement. Thus ideal geometry, estranged from the world, becomes “applied” geometry and thus becomes in a certain respect *a general method of knowing the real*.<sup>96</sup>

It is likely that Husserl is here referring to ancient astronomy and to its impressive predictive power. Indeed, we know that much of the debate Galileo was reacting to concerned exactly to what extent the method so successfully used in astronomy, a science that was meant to apply to a qualitatively different part of the universe, the superlunary sphere, could be applied also in physics. At this point, Galileo enters stage.

*Must not something similar be possible for the concrete world as such?* If one is already firmly convinced, moreover, like Galileo – thanks to the Renaissance’s return to ancient philosophy – of the possibility of philosophy as *epistēmē* achieving an objective science of the world, and if it had just been revealed that pure mathematics, applied to nature, consummately fulfills the postulate of *epistēmē* in its sphere of shapes: did not this also have to suggest to Galileo the idea of a nature which is constructively determinable in the same manner in all its *other aspects*?<sup>97</sup>

This question motivates Galileo’s mathematization of nature. What are the other aspects of nature that are here in question? As we already know, they are the specifically sensible properties or “plena” that fill out the spatiotemporal shapes of the things of perception and the causal properties in virtue of which things belong together in the one world of experience. The problem becomes, therefore, to understand how the *mathematization of the “plena”* can be possible, “plena” which, now, by virtue of the idea guiding Galileo, are deemed to manifest in themselves<sup>98</sup> entirely objective geometrical properties. Here, this “historical” analysis takes up the results of the constitutive theory Husserl had sketched in *Ideas II*: the *Aestheta* (as they were called in *Ideas II*) in their fullness must count as indications of objective mathematical determinations “appearing” in them.

In order to solve this problem, it is important to understand why the “plena” cannot be directly mathematized as spatial properties can. Husserl refers to the fundamental difference existing between shapes on the one hand and specifically sensible properties on the other. The former belongs necessarily to the “one total infinite extension of the world.”<sup>99</sup> This infinite extension, of which each form is, so to speak, a fragment, can be idealized along the lines described, and, as we know, can be constructively determined according to an a priori method. In other words, each real empirical fragment of extension can be conceived as an approximation of an ideal shape belonging to the space of geometry. This is not the case for the specifically sensible properties. Colors, sounds, tastes, and smells can indeed admit of quantitative determinations. We can certainly speak of brighter or more intense colors, or of louder sounds, but these degrees do not build up larger qualities that, so to speak, include the

smaller ones: qualities cannot be fragmented into parts nor combined to produce larger wholes, as is possible in the case of extension. Such is the root of their being intensive and not extensive properties. This essential lack of additivity makes it impossible to conceive them as fragments of a unitary world-form corresponding to them, nor as comprising so many times a given smaller portion. The latter fact is the reason they cannot be directly measured. There can be no analogue of the ruler in the case of a color, or of a warmth-property, no smaller standard that, via a certain method of composition, could “build” the original quality out of smaller parts, not even approximately, “with a rest.” For this reason, then, it does not make sense to consider such qualities as approximations of ideal types. Thus, they cannot be directly measured, nor, a fortiori, *directly idealized*. However, the possibility of exactness and approximation derives from the possibility of an empirical measurement “under the guidance of idealities.”<sup>100</sup> The only available solution, therefore, is to resort to an “indirect mathematization of that aspect of the world which in itself has no mathematizable world-form,”<sup>101</sup> an indirect mathematization based on the resources offered by *causality*: *if each specifically sensible aspect of the world is causally dependent on properties belonging to the realm of shapes, then the latter can be used to co-idealize the former*. This is the crucial idea of Galileo’s mathematization of nature, and, as we know, Husserl already outlined its structure in *Ideas II*. This idea, which today we take for granted when we explain “secondary qualities” as the effect produced in us by the impact on our body of external stimuli such as waves and, as we would say today, particles,<sup>102</sup> has made possible for the first time a rigorous objectivation of nature, according to the ideal guiding philosophy and after the model of what geometry had done for spatiotemporal shapes of things. “The whole of infinite nature, taken as a concrete universe of causality – for this was inherent in that strange conception – became [the object of] a peculiarly applied mathematics.”<sup>103</sup>

Note that Husserl characterizes this conception as “strange” not because he deems it essentially wrongheaded, but because he is trying to make us, accustomed as we are to the modern scientific way of thinking, appreciate the complexity of the web of motivations and of practical and theoretical accomplishments required to establish the mathematical science of nature within the unity of the European philosophical tradition. In this respect, the role of causality in the indirect mathematization of “plena” is itself highly problematic. We know that causality belongs to the general structure of reality, but “we do not have an a priori insight that every change of the specific qualities of intuited bodies . . . refers causally to occurrences in the abstract shape-stratum of the world.”<sup>104</sup> A mere reference to an all-encompassing causality is not sufficient for contriving Galileo’s idea, nor justifying it. This is why Husserl sets out to give further details about what could in the first place have motivated Galileo to take this theoretical and methodological step.

The everyday world experience, Husserl reminds us, already presents cases in which the sensible “plena” appear causally connected to events in the domain of spatial shapes. Obvious examples were known already to the ancients, as the correlation between the length of a vibrating string and the pitch of the tone that it produces. More generally, Husserl concedes that this sort of dependencies involving “plena” and shapes is quite common. However, Husserl adds, “In their vague indeterminacy they could not incite interest.”<sup>105</sup> Even the fortunate situations in which such dependencies allowed the development of methods of measurement were not enough to suggest the bold generalization accomplished by Galileo. The art of measurement guided by geometrical idealities, however, played, once more, a determinant role. Such idealities, by themselves, abstract from any sensible quality, but, once they are applied to the world of experience, this abstraction becomes impossible, because each actual shape involved in this methodology is also a “plenum” of qualities. Thus, for the practitioners of this technique, the features of idealized shapes, for instance “separability and divisibility in *infinitum*,”<sup>106</sup> were somehow transferred on to the objects of experience in their fullness. This implies, according to Husserl, a co-idealization of the sensible properties which themselves become “charged with infinity.”<sup>107</sup> Let us stress, however, that Husserl does not believe that Galileo was actually consciously motivated by these kinds of considerations. “For him a physics was immediately almost as certain as the previous pure and applied mathematics.”<sup>108</sup> What really mattered, for Galileo, was to develop actual methods of measurement that could carry out in practice the new program, methods that, under the guide of mathematical idealities, could admit of an endless improvement towards ideal poles.<sup>109</sup> These methods were necessary to mathematically determine reality and to abstract from the numerical results, thus obtaining “mathematical formulae” expressing laws of nature, in which the likewise idealized causality of nature was captured. The vague causal behavior of the world of experience thus becomes only the indication of the exact causality of physics.<sup>110</sup>

No matter how Galileo was “certain” of his new science, its fundamental idea nevertheless remains a *hypothesis* and not an a priori insight. It is the idea that nature is mathematizable in all of its aspects, not only in its spatiotemporal form, *but also in the full causal behavior of all its real-causal properties*. I will call this *Galileo’s hypothesis*, which amounts to the primal establishment (“*Urstiftung*”) of mathematical physics. This part of Husserl’s reconstruction ends with an important consideration about the specific character of this hypothesis. Its specificity lies in its difference with respect to the specific hypotheses that science constantly puts forward and constantly verifies. In common parlance, scientists do not call hypotheses “the theories” that they have already sufficiently verified, and this, in spite of the fact that no verification can ever be final. However, Galileo’s hypothesis, the hypothesis that founds physics, does

not admit of a direct verification even in this imperfect and relative sense. Observations and data can confirm Newton's theory or demand its emendation, but no data, no experiment, can even count as a specific direct verification of the hypothesis that nature is mathematizable. This is why Husserl asserts that:

The Galilean idea is a hypothesis, and a very remarkable one at that; and the actual natural science throughout the centuries of its verification is a correspondingly remarkable sort of verification. It is remarkable because the hypothesis, in spite of the verification, continues to be and is always a hypothesis; its verification (the only kind conceivable for it) is an endless course of verifications.<sup>111</sup>

As I read it, this passage means that the verification of Galileo's idea is the entire history of physics along with all its ongoing verifications. This "remarkable sort of verification" is, so to speak, a single procedure of verification that comprises, as moments, the verifications of all physical hypotheses, but, as a verification, it is never completed in the sense in which ordinary experiments are.<sup>112</sup> It is a sort of infinite experiment that yields more and more evidence in favor of the hypothesis, but that at the same time keeps it suspended to the further course of history. This endless verification coincides with the gradual convergence of natural science, through an endless progress of hypotheses, towards its ideal *telos*: "This means that it comes more and more to itself, to its 'ultimate' true being, that it gives us a better and better 'representation' [*Vorstellung*]" of what 'true nature' is."<sup>113</sup> One cannot but think once more of the first stage of the world annihilation as described in §47 *Ideas I*, when Husserl contemplated the eidetic possibility of a world (or, better, a surrounding world) that cannot admit of an exact physical determination. In light of this, Galileo's hypothesis concerns the very existence of an exact mathematical stratum of the world. It is not an ordinary scientific hypothesis at all, but a hypothesis *about the world*, about the possibility of its determination. Seen in this way, the hidden presupposition of a pre-given world becomes even more decisive. The world of physics is not a world, but the hypothetical infinitely determinable character of the world.<sup>114</sup> This, however, already anticipates considerations that will be developed later.

## §7. Technization and Emptying of Sense (*Krisis* §§9f–9g)

As we have seen, since his earliest writings on the subject, Husserl saw in the quest for empirical formulae the chief interest of natural scientists' research activity, so much so that such activity, in his view, had to be supplemented by a different scientific endeavor, the essential concern of which was to be authentically ontological. In two subsections of the

*Krisis* (§9f and §9g), Husserl details the origin and nature of this exclusive focus on empirical formulae and the dangers of technization that go with it. These two subsections follow the description of the mathematization of nature and precede the important subsection concerning Galileo's fundamental misunderstanding concerning the task and method of the new physics. At first sight, one would be tempted to think that the famous world-substitution discussed in §9h occurred because of the emptying of meaning of mathematical natural science through technization described in §9g. This is not the case, though. The narrative contained in these two subsections concerns a time period that stretches well beyond Galileo's own work and that anticipates the thoroughly "technical" style of scientific research that has become predominant long since his era up to our own era. We shall see, on the contrary, that this process of technization, which had roots in the autonomous advances of the mathematical sciences, was fostered by Galileo's original *ontological* misunderstandings.

Let us begin this discussion by reminding ourselves that modern physics is for Husserl an inductive discipline from the beginning, and the fact that it is an *a posteriori* exact science determines the complexity of its epistemological fate. Recall that in §40 of *Ideas I*, Husserl claimed that the thing of physics acts as a guide in the world of appearances, in the sense that it enhances our inductive power. More generally, Husserl's emphasis on the role of things in the constitution of nature, reiterated also in the exposition of Galileo's indirect mathematization of "plena," should not make us lose sight of the fact that physicists are not primarily interested in things and properties, but in events and relations among them. The mathematization of life-worldly things aims at determining them in such a way that their causal behavior becomes amenable to rigorous inductive procedures. Measurements collect data that allow ascribing (approximate) quantities to the properties of things and the processes involving them, and the "functionally coordinated quantities"<sup>115</sup> or *formulae* are the primary focus of the research. Thus, according to Husserl, "it is also understandable that some were misled into taking these formulae and their formula-meaning for the true being of nature itself."<sup>116</sup> The sense of this claim will be clarified later. For the moment, Husserl turns to a characterization of this "*Formelsinn*." In a few lines, Husserl recounts how this sense has undergone a process of "superficialization,"<sup>117</sup> which takes place between the starting point of the measurement procedures carried out in the experienceable life-world and the end point of the formalized language of the *mathesis universalis* and the theory of multiplicities. Husserl's quasi-historical reconstruction is here extremely dense, but it can be unpacked along the following lines.

The formulae of the science of nature functionally relate to one another through variables, not specific numbers (setting aside, for the moment, the so-called constants). The numbers obtained through measurement procedures (or that at any rate could be obtained through them



in certain possible circumstances) are fed into the variables in order for the formulae to yield the required predictions. Of course, these general formulae, along with their mutual relations, could not be successfully developed without a theory of “algebraic terms” (the variables appearing in the formulae), the invention of which Husserl attributes to Vieta, i.e., before Galileo himself. In what does this mathematical advance consist?

Initially this means an immense extension of the possibilities of arithmetic thinking that was ended down in old, primitive forms. It becomes free, systematic a priori thinking, *completely liberated from all intuited actuality*, about numbers, numerical relations, numerical laws.<sup>118</sup>

The effect consists in the fact that it becomes possible to develop arithmetic thinking without any intuitive support. This new and more powerful arithmetic thinking is applicable wherever numbers are. This explains the rapid growth of the scope of arithmetic that leads to the “arithmetization of geometry,” which Husserl immediately thereafter presents in the following terms:

An “arithmetization of geometry” develops an arithmetization of the whole realm of pure shapes (ideal straight lines, circles, triangles, motions, relations of position, etc.). They are conceived in their ideal exactness as measurable; the units of measurement, themselves ideal, simply have the meaning of spatiotemporal magnitudes. This arithmetization of geometry leads almost automatically, in a certain way, to the emptying of its meaning. The actually spatiotemporal idealities, as they are presented firsthand [*originär*] in geometrical thinking under the common rubric of “pure intuitions,” are transformed, so to speak, into pure numerical configurations, into algebraic structures. In algebraic calculation, one lets the geometrical signification recede into the background as a matter of course, indeed drops it altogether; one calculates, remembering only at the end that numbers signify magnitudes.<sup>119</sup>

This process is fully accomplished with the development of “analytic geometry,” in which, precisely, geometric figures are replaced by algebraic equations. But also “spatiotemporal shapes” can be treated in this way, e.g., the rectilinear or the uniform circular motions of kinematics. It should be stressed that the emptying of the meaning of geometry must not be confused with the original emptying of sense that affected geometry and to which Husserl will return in §9h and in the *Origin of Geometry*. Rather, it is a further drifting away from intuition that presupposes the first. The latter already took place in the ancient world,

when geometry became a technique, and concerns the forgetfulness of the idealizing accomplishments that gave birth to geometrical idealities in the first place, after which nobody ever questioned the origin of the “pure intuition” of geometry. What now takes place is a surmounting *even* of this “pure intuition” by means of algebraic thinking. Of course, this second step in the emptying of the sense of geometry is different from the first step. Whereas the origin of geometry in the life-world was altogether forgotten (and this remains the single most important event in this *history of the sense of scientificity*), the thinking based on the pure intuition of geometry can still be reactivated by the intentional accomplishments of scientists; but now it will “recede in the background as a matter of course” or be dropped altogether in theoretical activity.

This further drifting away from intuition makes another breakthrough with the advent of formalization.<sup>120</sup> Formalization drops any reference to the nature of the objects in question; therefore, in contrast with algebraic thinking, it drops the implicit reference to numbers, too. This was made possible by advances in algebraic theory, the far-reaching potentialities of which were envisaged for the first time by Leibniz under the title of *mathesis universalis*, which Husserl considers “the highest form of algebraic thinking.”<sup>121</sup> What Husserl has in mind, as is well known, is the development of formal logic in the broadest sense of the term, “a science of the forms of meaning of the ‘something-in-general’”<sup>122</sup> to which belongs the task of developing the theory of multiplicities (or manifolds) and, in particular, a theory of *definite multiplicities*. “With this sort of totality, one can say, the formal-logical idea of a ‘world-in-general’ is constructed. The ‘theory of manifolds’ in the special sense is the universal science of the definite manifolds.”<sup>123</sup>

This short narrative condenses the trajectory that from ancient (Euclid’s) geometry leads first to modern analytic geometry and to its “infinite” and yet deductively complete system, and, subsequently, to the formal idea of definite multiplicity, which yields not so much an objective “quasi-world,” but the empty form of “world-in-general” (as well as “quasi-world-in-general”). The challenge now is to understand how this narrative relates back to the sense of the natural-scientific formulae, which constituted its motivating starting point. This is what Husserl announces in the title of §9g, “The Emptying of the Meaning of Mathematical Science Through ‘Technization.’” This short subsection contains four paragraphs. However, the first paragraph, instead of turning right away to the theme announced in the section title, completes the narrative of §9f by describing the final stage of the technization of mathematical thinking and refers only marginally to mathematical physics. The second brief paragraph reminds the reader that the historical process just described, if correctly understood, marks, by itself, a progress of science. The third paragraph presents a more detailed account of why and how natural-scientific formulae provide the central concern of both

theoretical physicists (or “mathematical physicists,” as he calls them) and experimental physicists. Only at the end of this paragraph and throughout the remaining paragraphs does Husserl, based on his last considerations, explicitly focus on the theme indicated in the section title. Let us follow Husserl’s train of thought.

Can there be a further step in the distancing of mathematical thinking from intuition with respect to the one marking the development of pure logic and of the theory of multiplicities? Indeed, there can. Even formal-ontological truths, along with those pertaining to the theory of multiplicities, are ultimately based on intuitive insights of a particular kind in which their truth-sense is contained. Yet, even this truth-sense slips unnoticed in the background when formal-ontological truths are derived thanks to the manipulations of symbols afforded by algebraic thinking. This is what Husserl describes in the following terms:

This most extreme extension of the already formal but limited algebraic arithmetic has immediate application, in its a priori fashion, within all “concretely material” [*konkret sachhaltige*] pure mathematics, the mathematics of “pure intuitions,” and can thus be applied to mathematized nature; but it also has applications to itself, to previous algebraic arithmetic, and, again by extension, to all its own formal manifolds; in this way it is related back to itself.<sup>124</sup>

I take the “already formal but limited algebraic arithmetic” to be the simple algebra that is used to state general truths about numbers and their operations, for instance, when we say that “for any two numbers  $a$  and  $b$ ,  $a + b = b + a$ .” This algebraic arithmetic is already *formal* for it allows dropping reference to any specific numbers, but it is still “arithmetic” because it is about properties of numbers and arithmetic laws. In the aforementioned passage, Husserl discusses the application of this algebraic arithmetic in two directions. The first consists in the already mentioned application to the mathematics of pure intuitions, i.e., pure geometry and the a priori parts of physics. This application allows the transformation of, say, geometrical shapes in mathematical formulae that occurs in analytic geometry. Since there also now corresponds to the sensible “plena” of intuitive nature geometrical substructions of a specific kind, this application extends to mathematized nature as a whole. The application to the “already formal but limited algebraic arithmetic” is carried out in a second direction, as well, namely, “to itself” and “by extension to all its own formal manifolds.” This consists in the procedure whereby, for instance, the symbols  $a$ ,  $b$ ,  $+$ , and  $=$  which appeared in the arithmetic law stated earlier lose any reference to numbers and their operations and acquire a purely formal-ontological generality, i.e.,

they refer to any possible object and to any relations among them for which certain properties (in this case, the commutative property) holds. In keeping with mathematics, “ $a + b = b + a$ ” holds also if, say,  $a$  and  $b$  are  $n$ -dimensional vectors or continuous functions of a real variable and “ $+$ ” indicates a properly defined form of “sum” among them. The fact that this extended “ $+$ ” captures the form of the “ $+$ ” of arithmetic is articulated well if it is said that algebraic arithmetic, or, more properly, its notation, is “applied to itself.” By virtue of this second type of application, one arrives at a level at which formal-ontological truths are also obtained in a purely technical way, by simply applying rules of the transformation of strings of signs. At this level, their intuitive truth-sense sinks in the background.

But now [only] those modes of thought, those types of clarity [*jene Denkweise und Evidenzen*] which are indispensable for a technique as such are in action. One operates with letters and with signs for connections and relations ( $+$ ,  $\times$ ,  $=$ , etc.), according to *rules of the game* for arranging them together in a way essentially not different, in fact, from a game of cards or chess. Here the *original* thinking that genuinely gives meaning to this technical process and truth to the correct results (even the “formal truths” peculiar to the formal *mathesis universalis*) is excluded; in this manner it is also excluded in the formal theory of manifolds itself, as in the previous algebraic theory of number and magnitude and in all the other applications of what has been obtained by a technique, without recourse to the genuine scientific meaning [*eigentlichen wissenschaftliche Sinn*]; this includes also the application to geometry, the pure mathematics of spatiotemporal shapes.<sup>125</sup>

The modes of thought, the evidence necessary to operate with such “art,” are the simple, everyday ones that we use to recognize and manipulate symbols written on paper. This level of original evidence remains active in the intentional performances of the technicians. Yet, this is not what gives sense to the truths of the *mathesis universalis*, what bestows upon it its *genuine scientific sense*. This carries over also to the application of algebra to geometry. The type of *sui generis* “seeing” pertaining to the *mathesis universalis* and to geometry slips in the background. To speak in contemporary terms, we could say that the simple manipulation of strings of signs amounts to what a Turing machine, which can function even without the layer of everyday intentional activities that we use to manipulate signs, can accomplish (i.e., calculate). However, Husserl is not claiming that this long and complex process of technization has turned science in general, or even the community of mathematicians, into a gigantic Turing machine that

produces truths in a purely mechanical way. This would be impossible, no matter how advanced the process of technization is, and for several reasons. The claim is, rather, that the different layers of intentional performances that give sense to these activities go unnoticed. This is the problem, as Husserl adds in the second paragraph of this subsection, not the mathematical advances and the possibility of forgetting the sense that they imply, which are both legitimate as well as necessary for science. This legitimate use of the method, however, requires “keeping always immediately the original bestowal of meaning [*Sinngebung*] upon the method, through which it has the sense of achieving knowledge about the world”<sup>126</sup> and avoiding relapsing into an “unquestioned tradition” (“*unbefragte Traditionalität*”). Only by meeting these conditions will we avoid the “dangerous shifts of meaning” (“*gefährliche Sinnverschiebungen*”) that will be soon discussed.

The third paragraph suddenly turns to a brief characterization of the actual research activities of physicists that, by itself, is not intended to signal any “pathology.” The distinction between theoretical and experimental physicists here in question, which as a matter of fact became canonical only during the 19th century, indicates how much further in time beyond Galileo’s age this excursus stretches. Husserl describes their “cooperative interplay”<sup>127</sup> (“*Zusammenspiel*”) in a fairly classical way, as comprising, in an endless circle, an ascending movement from the work of experimenters to that of the theoreticians, and a descending movement from the latter to the former. Theoreticians receive from the experimenters “mathematical-physical formulae”<sup>128</sup> which they treat as purely mathematical expressions, where the empirical constants are fixed parameters. In this way, such formulae can be embedded in the machine of formal mathematics, which, in conjunction with the previously available mathematical-physical formulae, can yield new deductive, experimentally testable consequences. In addition, theoretical physicists develop wholly new hypotheses to be empirically tested. The work of the theoretician, then, out of necessity, takes place “in the arithmetized sphere of space-time, or at the same time in the formalized *mathesis universalis*.”<sup>129</sup> This sphere lies at a far distance from the intuitive sources that bestow upon their method its authentic scientific sense *as a method serving the task to cognize the world*. One could object that this remoteness from the intuitive sources should not affect the work of experimenters, busy as they are extracting intelligible empirical facts out of tangible experimental settings they have before their eyes.

But experimental physicists, too, are constantly oriented in their work toward ideal poles, toward numerical magnitudes and general formulae. Thus in *all* natural-scientific inquiry these are at the center of interest. All the discoveries of the old as well as the new

physics are discoveries in the formula-world which is coordinated, so to speak, with nature. The formula-meaning of this world lies in idealities, while the whole toilsome work of achieving them takes on the character of a mere pathway to the goal.<sup>130</sup>

What Husserl suggests is that, since experimenters strive for ideal poles lying at infinity, whether they are specific numerical magnitudes such as the speed of light or general formulae, they end up bestowing on these poles an intrinsic independence from their own practical activities. This independence projects a sort of “formula-world” (“*Formelwelt*”), which is the domain that both theoretical and experimental praxis is believed to explore.

At this point, after this brief reconstruction of what inevitably happens in scientific research, Husserl goes back, in the last paragraph, to the fact that the previously discussed process of technization hits upon the natural course of scientific research and completely transforms its “horizon of meaning.”<sup>131</sup> Scientists not only work as if their results were coordinated to a formula-world, they lose sight of the layers of sense that inform their activities. They become unable to reflect on what gave sense to them, starting with the original motivations that had guided Galileo in his first achievements. However, to better characterize this transformation, we have to turn to the next subsection of §9.

### §8. The Life-World as the Forgotten Meaning-Fundament of Natural Science (*Krisis* §9h)

The reference to the *Formelwelt* introduced by Husserl at the end of §9g sets the scene for the discussion contained in the famous §9h, in which the analysis of Galileo’s mathematization of nature reaches its apex. Subsections 9f–9g have sketched the progressive oblivion of the intentional operations that give sense to the method of mathematical physics up until Husserl’s own time. One would be wrong, however, in thinking that the insistence on technization, on formal operations emptied of intuitive meaning, or even on mechanical manipulation of symbols has the function of depicting modern and contemporary physics as an enterprise devoid of ontological import. On the contrary, the technization of natural science has an ontological pendant, which is, once more, *objectivism*. In §9h, Husserl explains that objectivism, from the very beginning, made it impossible to develop the higher, symbolic manipulations of theoretical physics and the practical methods of experimenters without losing sight of their original intuitive sense. The drifting away from intuition was thus a *consequence* of the fact that objectivism, already with Galileo himself (and, as far as geometry is concerned, even before), had obstructed the sources of intuition. We can thus appreciate why §9h opens with a

sudden focus on the ontological consequences of the mathematization of nature:

But now we must note something of the highest importance that occurred even as early as Galileo: the surreptitious substitution of the mathematically substructured world of idealities for the only real world, the one that is actually given through perception, that is ever experienced and experienceable – our everyday life-world. This substitution was promptly passed on to his successors, the physicists of all the succeeding centuries.<sup>132</sup>

This substitution (“*Unterschiebung*”), this ontological mistake that marks the very birth of modern physics and seals the fate of its self-understanding, concerns the soil from which science draws its sense: the life-world itself. As at all decisive points, Husserl stresses here the uniqueness of the world, the world given in experience. This world has been covered, hidden, by the mathematical manifold that physical theorizing substructures for the purpose of scientific knowledge, the “world of idealities” that is, precisely, *not a world at all*. In the following paragraph, Husserl gives a brief but powerful explanation of this substitution, which will help us understand what is really meant by it. The determining factor of this ontological mistake is to be found, once more, in geometry and in its traditionality: geometry is the sense-fundament of mathematical physics, just as the art of measurement is the sense-fundament of geometry. Husserl begins by repeating what he has already said about the transformation of geometry into a technique, which took place already in the ancient world. This technization is due to the forgetfulness of the difference between the “truly immediate intuition and original intuitive thinking” and the “so-called geometrical intuition, i.e., that which operates with idealities.”<sup>133</sup> The so-called intuitiveness of the latter makes sense only on the basis of the “truly immediate” intuitive procedures that are at work in the art of measurement. Galileo’s “fateful omission” was not to inquire back into this fact.<sup>134</sup> Consequently, he did not reflect on the difference between the intuitive shapes of the life-world and the idealized shapes of geometry. In the *Origin of Geometry*, we find a more detailed account of the reason why, at the time of Galileo, geometry had already become a technique oblivious to the real sense of the truth of its propositions.

Let us recall that, in that text, geometrical idealities acquire a real objectivity only by virtue of their sedimentation in written language. However, this kind of sedimentation has made it possible to teach and learn geometry without reactivating the original creation of idealities out of the art of measurement. Indeed, if the handing down of geometric knowledge had preserved the written indication of how those idealities can arise out of “prescientific materials,”<sup>135</sup> geometry could have

remained a genuine tradition. But this has not happened. Geometrical notions have been handed down without their generative process, as “*ready-made* concepts”<sup>136</sup> illustrated by drawn figures. Thus, “rendering the concepts sensibly intuitable by means of drawn figures is substituted for the actual production of the primal idealities.”<sup>137</sup> Of course, this process was fostered by the practical usefulness of geometry, which encouraged its diffusion under the form of a technique emptied of meaning, of a non-genuine [“*unecht*”] scientific tradition.<sup>138</sup>

At this point in this subsection, Husserl, in a few words, explains why this omission determined the substitution of the world of idealities (ultimately, of nature conceived as a mathematical manifold) for the life-world:

Thus it could appear that geometry, with its own immediately evident a priori “intuition” and the thinking which operates with it, produces a self-sufficient, absolute truth which, as such – “obviously” – could be applied without further ado. That this obviousness was an illusion – as we have pointed out above in general terms, thinking for ourselves in the course of our exposition of Galileo’s thoughts – that even the meaning of the application of geometry has complicated sources: this remained hidden for Galileo and the ensuing period. Immediately with Galileo, then, begins the surreptitious substitution of idealized nature for prescientifically intuited nature.<sup>139</sup>

The so-called pure intuition of geometry makes us immediately leap, so to speak, in front of the ideal truths of geometry, which thus become “self-sufficient,” “absolute,” instead of being dependent, relative in their sense to the constructive procedure of idealization that we have described. In other words, the truth of geometry loses its sense, and so does its method. To the technization of geometry, to its emptying of intuitive sense, to the oblivion of the intentional operations underlying it, there corresponds its *objectivist* interpretation. This is what Husserl refers to as the mistaken belief that geometrical truths can be applied “obviously.” Let us recall that geometrical concepts are general in character but are intrinsically different from ordinary morphological concepts. Their generality is that of an archetype rather than that of a universal. Thus, their application to concrete individuals is never “obvious” and requires precisely the previously discussed processes of approximation that presuppose the gap between intuitive and ideal shapes. However, when the geometrical concepts and truths were interpreted as “self-sufficient,” they were believed to be applicable “by themselves,” solely by virtue of their own resources. The intuition of the geometer discloses immediately geometrical truths, likewise immediately applying them to real particular bodies and movements that are, so to speak, transposed in the space of the same intuition.



How does this relate to the “world-substitution” that, somewhat abruptly, Husserl reintroduces at the end of this passage? If the truth of geometry is believed to directly apply to the world (the world in which real natural phenomena occur and which, as we know, is the object of the science of nature) then *not only is the sense of geometric truth lost, but also, and more importantly, the sense of being of the world is lost*. The world, the “true world,” becomes *that* in which ideal properties inhere intrinsically instead of *that* which is given in our experience, i.e., the life-world. To be sure, this substitution does not occur as though Galileo had been aware of the difference between the two worlds. Rather, he built his notion of the world out of this equivocal application of geometry, and he ended up, through the mathematization of the sensible “plena,” with a notion of the world leaving no room for the world of intuition. In a word, the objectivist interpretation of geometry led to the objectivist interpretation of the world itself.

We are back, then, to the opposition between Galileo and Plato established by Husserl at the beginning of his analysis.<sup>140</sup> As anticipated, the key factor lies in their different conceptions of the relation between the real and the ideal. Only with Galileo do the two merge into a world constructed, so to speak, from above, from the idealities, in which real particular themselves perfectly instantiate idealities and are therefore absorbed in the domain of the ideal.<sup>141</sup> Since the rootedness of natural science in the life-world remained unnoticed, it is not surprising that philosophical reflections on the new science “stop[ped] at idealized nature,”<sup>142</sup> too. Husserl here anticipates what he will explain in detail in the remaining sections of *Krisis II*, namely, that modern rationalism takes it for granted that nature is the idealized nature of physics without inquiring back into its prescientific origin.

Galileo’s fateful omission neglects precisely the facts that give sense to the exact science of nature: its rootedness in the perceptual world, in an intuitive domain, its dependence on the prescientific praxis that takes place in it. Furthermore, Galileo forgets that the life-world is necessarily the horizon of all inductions, whether scientific or prescientific. This reminds us of Husserl’s analyses in *Ideas I*, where he argued that even scientific inference is always confined to the one world given in perception. Yet, in this world “we find nothing of geometrical idealities, no geometrical space or mathematical time with all their shapes.”<sup>143</sup>

The following paragraphs of this section are extremely famous and contain some of the most quoted passages of the entire *Krisis*. As such, they deserve to be quoted in full and commented on with care.

This actually intuited, actually experienced and experienceable world, in which practically our whole life takes place, remains unchanged as what it is, in its own essential structure and its own concrete causal

style, whatever we may do with or without techniques. Thus it is also not changed by the fact that we invent a particular technique, the geometrical and Galilean technique which is called physics. What do we actually accomplish through this technique? Nothing but *prediction* extended to infinity.<sup>144</sup>

Let us first remark that Husserl qualifies geometry and physics as techniques because they have undergone the process of technization so far described (in the case of geometry, already in the ancient world), i.e., they have lost the sense of their method and of their truths. This statement should thus not be taken to mean that geometry and physics cannot possibly be but mere techniques. As we know, they both carry in themselves the primal sense of being branches of philosophy, of the universal science of what is. As we know, a theoretical technique, such as Galilean physics, is not in Husserl's terminology a praxis that achieves practical results as opposed to truths, but rather, a non-genuine (inauthentic) science that yields truths without their sense. Mathematical physics, indeed, bears in itself the *entelechy* of becoming genuine science, that is, philosophy, or, in keeping with Husserl's earlier terminology, metaphysics. A fortiori, one should not read the peremptory claim that prediction is the sole accomplishment of this Galilean technique as an indication that Husserl has become by the time of the *Krisis* an instrumentalist with respect to physics. The entire development of Husserl's idea of science rules out such an interpretation, and the insistence with which Husserl ascribes to physics the inborn character of "the *episteme* of nature" should suffice to highlight this point. However, in order to avoid any possible doubt in this respect, let us go back to the initial claim that the life-world remains *unchanged in its essential structure* by what we do with our techniques and, in particular, by the practical and theoretical achievements of physics. The worldliness of the world, the essential structure that pertains to the world of experience, will always underlie any practical or theoretical achievement. Their "*Leistung*" is to be understood in relation to this unchangeable world. According to Husserl, the "*Leistung*" of physics is prediction. But let us read what he adds immediately after:

All life rests upon prediction or, as we can say, upon induction. In the most primitive way, even the ontic certainty of any straightforward experience is inductive. Things "seen" are always more than what we "really and actually" see of them. Seeing, perceiving, is essentially having-something-itself [*Selbsthaben*] and at the same time having-something-in-advance [*Vorhaben*], meaning-something-in-advance [*Vor-meinen*]. All praxis, with its projects [*Vorhaben*], involves inductions; it is just that ordinary inductive knowledge (predictions), even if expressly formulated and "verified,"

is “artless” compared to the artful “methodical” inductions which can be carried to infinity through the method of Galilean physics with its great productivity.<sup>145</sup>

In this passage, Husserl begins by explaining that prediction in the broad sense of induction is the hallmark of all intentional activities through which the things and events of the life-world are given to us. The theory of adumbrations and the horizon structure of perception are here evoked in a few lines: the posits of ordinary experience are made possible by a form of anticipation contained in the very sense of each perceptual act. I would not see a table if I did not “predict” (at least in vague generality) what I would see by turning around. We always intend-something-in-advance: perception too objectifies only by going beyond what is really given, by anticipation. Thus, the difference between ordinary knowledge and Galilean physics is one of “method” only. It follows that, if Husserl were evoking the “predictive power” of physics in order to claim that physics does not yield any real knowledge about the world, then, by the same token, he would have to make the same claim about ordinary experience. This is, at bottom, Mach’s position: both the properties that go into the formulae of physics and the objects of ordinary experience are useful fictions, “symbols” for regulated series of sense data (of *elements* considered as sense data). But we already know that this is not Husserl’s position. Again, when Husserl in *Ideas II* says that things of perception are “rules for appearances,” he does not intend to take anything away from their real being. The elucidation of their sense of being consists in describing how, in the internal flow of time, a ramified series of intentional acts can intend the same objective pole. The transcendence of the intended object is made possible by this fact. Each intentional act, by intending an object, already implicitly anticipates what intentional acts will occur in the flow of experience should a certain kinesthetic series be actualized. In other words, Husserl is not opposing “mere predictivity” to “real knowledge of what exists.” The latter can be partial or approximate, can even undergo revision, but ultimate true objectivity *is* prediction ideally carried out to infinity. This is the task of physics. The fundamental opposition Husserl constantly refers to, then, is between the relative transcendent being, which is always a rule for appearances, and the phenomena themselves, which are not given by adumbrations. We have to keep these last remarks in mind while turning to the subsequent part of the text, where Husserl evokes the famous notion of a “garb of ideas” (*Ideenkleid*):

In geometrical and natural-scientific mathematization, in the open infinity of possible experiences, we measure the life-world – the world constantly given to us as actual in our concrete world-life – for

a well-fitting *garb of ideas*, that of the so-called objectively scientific truths. That is, through a method which (as we hope) can be really carried out in every particular and constantly verified, we first construct numerical indices for the actual and possible sensible plena of the concretely intuited shapes of the life-world, and in this way, we obtain possibilities of predicting concrete occurrences in the intuitively given life-world, occurrences which are not yet or no longer actually given. And this kind of prediction infinitely surpasses the accomplishment of everyday prediction. Mathematics and mathematical science, as a garb of ideas, or the garb of symbols of the symbolic mathematical theories, encompasses everything which, for scientists and the educated generally, *represents* [takes the place of] the life-world, *dresses it up* as “objectively actual and true” nature. It is through the garb of ideas that we take for *true being* what is actually a *method* – a method which is designed for the purpose of progressively improving, *in infinitum*, through “scientific” predictions, those rough predictions which are the only ones originally possible within the sphere of what is actually experienced and experienceable in the life-world. It is because of the disguise of ideas that the true meaning of the method, the formulae, the “theories,” remained unintelligible and, in the naïve formation of the method, was *never* understood.<sup>146</sup>

The first part of this passage (until “everyday prediction”) characterizes “the so-called objectively scientific truth” as a garb of ideas that is tailored to the life-world. This garb of ideas is realized precisely through the previously described method of direct and indirect mathematization the progressive and hypothetical nature of which (“we hope”) is immediately stressed. The natural-scientific truth is, as we know, always in process and resting on a fundamental hypothesis, the verification of which is infinite. Its sense is again equated to that of a systematic and methodic “prediction.” Husserl then goes back to the central theme of §9h, the world-substitution, and restates in a more effective way the nature of Galileo’s error. The garb of ideas takes the place of the life-world and transfigures it into an ontologically independent and true mathematized nature. Once more, the claim is not that scientific theories do not, or cannot in principle, state the truth about the world of experience, but that the mathematical determinations of physics (space, time, and all the theoretical determinations that fill them) become a self-standing world – indeed, they become altogether *the world*. We can now understand what Husserl means when he says that “we take for *true being* what is actually a *method*”: because of the objectivist interpretation of the garb of ideas, we have taken *for real nature* that which is actually a method of theoretically determining nature, the nature of prescientific experience:

*Galileo's method of the mathematization of nature has been taken for the discovery of a nature mathematized in itself, or, better, the application of the method of mathematization to nature has been taken as an access to a nature mathematized in itself.*

The following lines support further this interpretation.

Thus no one was ever made conscious of the radical problem of *how* this sort of naïveté actually became possible and is still possible as a living historical fact; how a *method which is actually directed toward a goal, the systematic solution of an endless scientific task*, and which continually achieves undoubted results, could ever grow up and be able to function usefully through the centuries when no one possessed a real understanding of the actual meaning and the internal necessity of such accomplishments.<sup>147</sup>

This question addresses the almost mysterious character of what Husserl calls theoretical techniques: how could the method of physics work so wonderfully in spite of the total misunderstanding concerning the sense of its results? How can such a one-sided and misguided rationality still achieve so much? Ultimately, this is the problem of how reason can be hidden to itself, and how a great founder of a science can, at the same time, discover and hide. So much is necessary if the history of European culture is to be a history of efforts of reason to come to itself. For now, let us simply stress that, in this passage, Husserl characterizes the method of natural science as directed towards an endless scientific task. This method was meant to produce an *episteme of nature*, but, instead, it became a mere ladder to reach for a mythological objectivized nature in itself. The subsequent further technization of physics through formalization has completely canonized this objectivist interpretation of natural science.

## §9. First Consequences of Galileo's Misunderstandings (*Krisis* §9i)

In this subsection, Husserl begins to describe the epistemological and ontological consequences of the misunderstandings surrounding the mathematization of nature, in part anticipating the content of a large chunk of the remaining sections of *Krisis II* and the initial sections of *Krisis IIIA*. The first consequences appear under the heading of the subjectivity of the experienced qualities:

The phenomena are only in the subjects; they are there only as causal results of events taking place in true nature, which events exist only with mathematical properties. If the intuited world of our life is merely subjective, then all the truths of pre- and extra-scientific life

which have to do with its factual being are deprived of value. They have meaning only insofar as they, while themselves false, vaguely indicate an in-itself which lies behind this world of possible experience and is transcendent in respect to it.<sup>148</sup>

This passage explains perhaps the single most significant consequence not of the mathematization of nature as such but of its objectivist misinterpretation. In phenomenological terms, “the phenomena” in this passage amount not only to “the appearances” but also to “what appears.” What appears as belonging to the world of experiential intuition becomes “subjective” in the ontological sense of the term, i.e., becomes a component of the subject, arising in it by virtue of causal processes that occur in the “external world,” i.e., in true nature. This true nature is defined in terms of mathematical properties only. Thus, for instance, the expression “the tree that I see” would mean either “the visual image of this tree,” which would be an immanent mental content, an *idea* in the mind, or “the real tree that exists in true nature and is made out of, say, atoms and molecules.” The “*leibhaftig*” tree, the life-worldly tree, has been effaced, along with the rest of the life-world. The core of essential features of the life-world has been dismembered in an odd way. On the one hand, the life-world’s worldliness, its prerogative of being the only real world, the only domain of objects deserving that name, has been handed over to a mathematized nature in itself, which thus becomes a self-standing nature, totally objective, existing independently of human and animal subjects. On the other hand, the life-world, inasmuch as it is intuitively given to us, is absorbed by *the mind* under the heading of phenomenon or appearance. The mind is itself a self-enclosed domain annexed to the body of animals and humans, which are, in turn, parts of mathematized nature. In the language of *Ideas*, there only remains the higher order transcendence of the physical thing and, in addition to it, the pure immanence of mental contents. Here, Husserl enters territory very familiar to us. That which has just been outlined is perfectly in line with the misunderstandings concerning the transcendence of the world that we discussed at length in Chapter 3. Yet, as we know, there are more consequences that must be understood in detail.

An important consideration that it is worth introducing at this point concerns the very use of the term “world.” In §9, on more than one occasion Husserl seems to use “world” and “nature” interchangeably. Now, strictly speaking, Galileo mathematized nature only, and, to be more precise, only material nature. The life-world includes not only the minds of animals and humans, which were not and (according to Husserl) cannot in principle be regarded as mathematical manifolds, but also the cultural objects. Now, the world-substitution referred to in §9h could be better described as a *nature-world substitution*. To be sure, Galileo’s mathematized nature has taken the place of the prescientific intuitive

nature, as Husserl says; but, by virtue of the just described dichotomy between mathematized nature and mind, all practical and aesthetic values are downgraded to subjective occurrences in what now appears as the fragmented being of the different psyches. Thus, abstracting from the perspective introduced by the minds of animal and humans, “external world” and “nature” become equivalent. Consequently, Husserl’s terminological oscillations are not without reason. Galileo’s nature takes the place not only of the intuitive, prescientific nature, but also of the whole life-world, which (depending on the way in which it is apprehended) offers the themes of all scientific investigations. As already anticipated, this fact, for Husserl, prevented the birth of a truly scientific pure psychology and, more generally, of all other sciences of spirit, which have their roots in the life-world and for which the objectivation and fragmentation of the spiritual world amounts to an ontological catastrophe.

### §10. The Significance and Nature of the Considerations About the Origin of Mathematical Physics (*Krisis* §§9k–9l)

The last two subsections of §9 constitute a sort of *coda* of the entire analysis. Subsection 9k contains general considerations that connect the discussion of the origin of mathematical physics back to the historical vicissitudes of the idea of *episteme*. Subsection 9l contains a short reflection on the method followed in §9, in which Husserl also reasserts in a particularly clear way why the mathematization of nature plays such an important role in the overall structure of the *Krisis*. As to the first point, the preceding exposition already contains enough indications. Noteworthy in §9k is, most of all, the vehemence with which Husserl proclaims that only the ability to inquire back into the primal establishment of the method of natural science can save it from becoming a simple technique<sup>149</sup> and that this primal establishment was commanded by “the interest in true knowledge of the *world itself, nature itself*.”<sup>150</sup> The sense of Husserl’s analyses in §9 consists precisely in showing that the world itself has been hidden by the misunderstandings concerning the mathematization of nature: our physics, as it stands, is simply not a science of the world, not a science of nature, not a genuine science at all.

The extremely important considerations on *method* that we find in §9l begin, in classical Husserlian fashion, by reminding the reader of the *goal* of these historical analyses as presented in *Krisis I*. As we know, in *Krisis I*, Husserl had already characterized, through a first historical consideration, the situation of the crisis of the European sciences and of philosophy in general. It is this situation that had demanded the further historical inquiry developed in *Krisis II*, of which §9 is such an important part. The clarification of the crisis carried out in *Krisis II*, as we know, is itself part of the attempt to show the possibility and the

necessity of transcendental phenomenology. It is at the beginning of subsection 9I that Husserl's gives a clear characterization of the notion of *origin*.

The historical reflections we embarked upon, in order to arrive at the self-understanding which is so necessary in our philosophical situation, demanded clarity concerning the *origin of the modern spirit* and, together with that – because of the significance, which cannot be overestimated, of mathematics and mathematical natural science – clarity concerning the origin of these sciences. That is to say: clarity concerning the *original motivation and movement of thought which led to the conceiving of their idea of nature, and from there to the movement of its realization in the actual development of natural science itself*.<sup>151</sup>

The origin of modern spirit is intertwined with the origin of mathematics and of mathematical physics. The origin of these sciences, in turn, is defined by the motivation and movement of thought concerning two things, the idea of nature and the actual development of the corresponding science. The two elements correspond to the task of mathematical physics, its object under the guidance of an idea and its methodical realization. Thus, the origin of mathematical physics is, at bottom, the origin of its task and method. This definition does not mention the life-world as the horizon in which such origin occurs. However, the connection with the life-world can be easily worked out. The life-world is the ground of all prescientific and scientific activities, activities performed by personal subjects *motivated* by goals and values. On the other hand, the life-world contains in itself all possible themes of scientific research. Therefore, necessarily, the life-world is where any quest about origins must take place. Reconstructing the origin of a science means studying how personal subjects motivated by the value of *theoria* have conceived the idea of the object of that science out of a given structure of the life-world as well as the method apt for it. Reconstructing the origin of science (or philosophy) in general requires, furthermore, understanding the motivation and the movement of thought that, on the one hand, has turned the life-world itself into an object of *theoria* and, on the other hand, has led to the emergence of an attitude in which personal subjects are motivated solely by the value of *theoria*. This is what Husserl has done, in outline, in the *Vienna Lecture*. The sense of this crisis can be grasped only in light of this quest for origins.<sup>152</sup>

Husserl further characterizes the method utilized for this inquiry as involving a *forward and backward zigzag* movement. Between what poles does this forward and backward movement take place? One pole is the *origin itself*, the original sense-bestowal of the “founder” of modern mathematical science. The other pole comprises the “present-day form”



of this science, along with the historical development that has led up to it. We look back from the present state of science to its historical development, and we give a first characterization of Galileo's original founding endeavor within its motivational situation.

In respect to the situation as he found it and to the way in which it had to motivate him and did motivate him according to his known pronouncements, much can be established immediately, so that we understand the beginning of the whole bestowal of meaning [*Sinngebung*] upon natural science.<sup>153</sup>

Why can't this first movement suffice? Why can't we already proclaim that we have understood the origin of modern spirit? Because this first backward movement reveals the "shifts and concealments of meaning of later and recent times."<sup>154</sup> We realize that we are ourselves influenced by prejudices that have to do with these shifts and concealments and that this modifies our understanding of the development in question. This development now acquires a sense by virtue of the first understanding of the origin. This is the first forward movement: a sense now is grasped through the historical development which will allow us to inquire back deeper into the origin.

Thus, we find ourselves in a sort of circle. The understanding of the beginnings is to be gained fully only by starting with science as given in its present-day form, looking back at its development. But in the absence of an understanding of the *beginnings* the development is mute as a *development of meaning*. Thus we have no other choice than to proceed forward and backward in a zigzag pattern; the one must help the other in an interplay. Relative clarification on one side brings some elucidation on the other, which in turn casts light back on the former.<sup>155</sup>

According to Husserl, this methodological clarification justifies the presence, in his narrative, of historical leaps, "which are thus not digressions, but necessities."<sup>156</sup>

Unfortunately, Husserl does not provide any specific examples taken from §9 to illustrate in detail the application of the different steps included in his method. However, we can find a hint in his last remark about the necessity of these historical leaps. This suggests that we look at §§9f–9g, which, after the first description of Galileo's historical and motivational situation in §9a and §9b and after the first reconstruction of the origin of physics in §§9b–9e, contains, as we already noted, what looks like a long digression leading us back to our time and interrupting the Galileo narrative. Indeed, these two sections cover a timespan

that stretches from even earlier than Galileo (i.e., from Vieta) to Husserl's contemporary division of labor between experimental and theoretical physicists. In light of Husserl's methodological remark, we can now appreciate that §§9f–9g did not amount to a digression at all, but to a first movement forward in time, after the first movement backward, towards the origin of physics. Following the first elucidation of the *beginning*, which has cast light on the complex series of steps that had to be taken to develop a science able to objectify intuitive nature in all of its eidetic components, the entire history of mathematical physics up to now can be read as a *development of meaning*, to repeat the words appearing in the last quotation. The *development of meaning* in question in §§9f–9g is, somewhat paradoxically, precisely “the emptying of meaning through technization,” a development that could be understood after inquiring back into the original intuitive sources of the mathematization. When, at the very beginning of §9h, Husserl goes back to Galileo and his primal establishment, the clarity acquired in §§9f–9g about the development that leads up to our present age is immediately “cashed out” in a backward movement. We go back to Galileo and to his “occultation” of the life-world as the origin of all subsequent emptying of sense.

This methodological structure, to be sure, is not unique to §9, although Husserl clarifies it only at this point. If we turn to *Krisis I*, we find that this zigzag movement was already performed there and that §9 is a reconsideration of the origin of modernity in light of it. Indeed, *Krisis I* opens on the quest of a correct sense in which one might say that the European sciences are in crisis, and this quest motivates, at the beginning of §3, a first movement backward to the origin of modern European humanity, which makes possible a first reconstruction of its history up to now in §§4–6. This reconstruction perfectly epitomizes the idea of how an insight into an origin – in this case, the renewal of the Greek ideal of philosophy – animates the following historical facts with a *development of meaning*, which in turn calls for the more thorough analyses of *Krisis II*. The function of the *Origin of Geometry* in the wider context of the *Krisis*, I believe, should be understood along these lines, too.

Let us also mention a final methodological remark by Husserl, one concerning the lack of technical language in his historical considerations. The reason he offers for this is that this is a deliberate choice dictated by the nature of his attempts “to bring ‘original intuition’ to the fore – that is, the pre- and extrascientific life-world, which contains within itself all actual life, including the scientific life of thought.”<sup>157</sup> Husserl's attempt, strange though it might seem, is to understand the historical development of science with the “limited” resources offered by a language that remains close to the original experience of the world. It is a history “from

the standpoint of original intuition.” This domain of original intuition also contains the web of motivations that animate this history, which is narrated with a minimal amount of references to specific authors and texts. For this reason, it is quite dangerous to try to read too much history of science and philosophy into it. Rather, the reader should take very seriously this final methodological remark, and try as much as possible to make sense of Husserl’s narrative with its internal resources, which are, precisely, non-technical.

In conclusion, I would also like to add a remark pertaining to the methodological difference between the historical considerations of *Krisis I* and *Krisis II* and those developed in the *Origin of Geometry*. It is customary to believe that that text should have been added somewhere to §9, and, indeed, I have summed up some of its most important conclusions and then used them as clarifying supplements. Be that as it may, that text presents an internal structure that is quite different from that of *Krisis II*. The reason is that the *Origin of Geometry* is a pure example of *internal history* (“*innere Historie*”), as Husserl calls it,<sup>158</sup> while *Krisis II* is not. Internal history is based on the pure unfolding of “historical a priori” and omits reference to any empirical facticity. In other words, geometry as a cultural fact can be analyzed in terms of what we know a priori about the “world of history” and about the life-world in which history necessarily takes place. If geometry is an activity, then it must have been invented by a human being, first individually and then in community; given that its subject matter is spatial shapes, the ultimate material for it must be offered by our perceptual environment, etc. Husserl regards all the different steps of communalization previously discussed as knowable a priori, and no claim made there awaits corroboration or refutation by any empirical evidence stemming from historical research. As Husserl explains at the end of that text, a rich a priori structure belongs to the subject matter of history, though historians are normally unaware of it. This holds true, first, in general about any type of history, and, in a more particularized way, about specific history, such as the history of geometry. This is of course not what we find in *Krisis I* and *Krisis II*. No matter how meager the historical information and the textual references are, here we find a wealth of historical facts that one cannot derive a priori. Husserl evokes the actual history of modern science and philosophy by referring to specific figures and their writings and ideas. The question becomes what relation this type of history entertains with the purely a priori history of the *Origin of Geometry*. The following passage suggests the answer:

If the usual factual study of history in general, and in particular the history which in most recent times has achieved true universal extension over all humanity, is to have any meaning at all, such a meaning can only be grounded upon what we can here call internal history,

and as such upon the foundations of the universal historical a priori. Such a meaning necessarily leads further to the indicated highest question of a universal teleology of reason.<sup>159</sup>

Let us recall that no empirical science can ever be rigorous, according to Husserl, unless it is grounded in the a priori of its subject matter, ultimately in a regional ontology. This holds true also for historians. Their science, as all sciences of spirit, lack a developed a priori part and this, for Husserl, attests to their immature character with respect to the sciences of nature.<sup>160</sup> Unless this a priori component is put to work, unless history has become rigorously scientific, it cannot acquire a sense (it cannot become a “development of sense”). Only thereafter will the dimension of the teleology of reason be disclosed (i.e., a question that, let us stress, Husserl characterizes here as the “highest”). Now, since at the end of *Krisis I* Husserl anticipates his aim in *Krisis II* as “strik[ing] through the crust of the externalized ‘historical facts’ of philosophical history [history of philosophy], interrogating, exhibiting, and testing their inner meaning and hidden teleology,”<sup>161</sup> what can be inferred is that the narrative contained in it is *an example of factual history informed by the a priori of history*. A text such as the *Origin of Geometry* would thus provide not so much a supplement to the narrative as a component of the a priori form that “animates” the facts of modern philosophy and turns them into a *development of sense*, into a genuine narrative.<sup>162</sup> Beyond this narrative, one can discern the teleology of reason, and the “practical possibility” of a completely new kind of universal philosophy becomes manifest.<sup>163</sup>

### §11. Further Criticism of the Interpretations Deriving From the Philosophy of Science

In this and in the following three sections, I will draw a number of conclusions from the preceding analysis of §9 of the *Krisis* and develop a comparison with Husserl’s *Ideas*. Let us begin by going back to the tendency of reading Husserl’s analysis of the mathematization of nature in an “antirealist” fashion. According to the reading I proposed, §9 does not contain any elements that might suggest a modification of Husserl’s previous way of conceiving the relation between the world of perception and physical theory. Here I would like to add only a final series of considerations based on the intrinsic incompatibility between Husserl’s philosophy and any view downplaying the epistemic value of physical theory.

Let us imagine for a moment that, according to Husserl (whether at the time of the *Ideas* or the *Krisis* makes no difference here), the exact natural sciences were only able to yield correct predictions at the level of perceptual appearances rather than knowledge about true nature as it is in itself. Four alternatives remain open. (1) The “in-itself” of nature does

not exist. (2) Nature as it is in itself is beyond the reach of our knowledge. (3) Nature as it is itself is beyond the reach of natural science but it can be cognized by a different science. (4) We remain agnostic as to whether nature has an “in-itself” and what form of knowledge would be capable of apprehending it. The important point to make is that all four of these alternatives are incompatible in principle with transcendental phenomenology.

The first alternative normally takes the form of the thesis that, since the life-world is the only truly existing world, Galileo’s idealized nature does not exist (where “idealization” is intended in Husserl’s own sense). One should immediately ask with what right Husserl could make this claim from the standpoint of transcendental phenomenology, unless the existence of such nature implied a phenomenological countersense. I have already argued at length that there is no such countersense, if only one understands correctly the eidetic distinction between originally presentive perception and idealization. Furthermore, if nature had no “in-itself,” the life-world’s ordinary objects would be the last word in terms of possible knowledge. However, these objects are subjective-relative, they appear in different ways to different subjects, and to different species by virtue of the different horizons pertaining to their perceptual life. There is, at this level, no single way in which an object truly is as against the way it appears, no objective truth, in spite of the possibility of identifying a common spatiotemporal core based on its different ways of appearing. It would be ironic if Husserl’s aim were to claim that the science of nature rescues itself from the status of mere *techné* and regains its place in philosophy as the universal science of being by forsaking the object to which its theories are supposed to correspond. What kind of *epistémè* would natural science end up being if there were no objective truth about nature? In what way would a phenomenologically founded science of nature be a part of metaphysics as the ultimate science of reality? Under this interpretation, Husserl’s philosophy would, if anything, cast the European sciences into a state of crisis far worse than the one deriving from physicalistic objectivism. As we know, transcendental phenomenology admits the possibility in principle that the objective world of physical theory might not exist. However, this is nothing less than the first step in the annihilation of *the world* described in §47 of *Ideas I*. Under that hypothesis, what would exist, viz., a world that cannot be mathematized, nor theoretically objectified, would be a mere *Umwelt*, a mere subjective-relative surrounding world. In such a world, there would be no true physical theory, no objective truth about the things we perceive, no way to situate our perceptual *Umwelt* in a natural history stretching from the origin of the universe onward: there would be no natural science awaiting philosophical interpretation. The eidetic possibility of such an impoverished correlate of transcendental consciousness in no way threatens the sense of natural science *qua* eidetic possibility; it only highlights

its dependence on “hypotheses” (such as the aforementioned Galilean hypothesis) that ground the very possibility of physical hypotheses about idealized nature.

The second alternative is, simply put, incompatible with Husserl’s fundamental claim that there is a correlation between being and knowability, i.e., with Husserl’s concept of correlation and transcendental idealism. A being that lies in principle beyond all horizons of knowing consciousness is, truly, a phenomenological countersense, at least as long as we understand correctly the sense of transcendental idealism.

We come to the third alternative. In Chapter 1, I mentioned that Pierre Duhem held a view of this kind, for he believed that a metaphysics of Aristotelian inspiration would perform the task precluded to physical theory. Now, in addition to the fact that there is no textual evidence that Husserl ever entertained such a view, it is not difficult to see the impossibility of grafting it into Husserl’s philosophy. What would be the intuitive sources of such a metaphysics? Or the eidetic components? Nature is the sphere of what constitutes itself in experience, not something lying beyond it. *That* experienced nature is cognized by physics, in principle, down to its ultimate objectivity, and, as we have seen in Chapter 4, mathematized nature does not point to anything beyond itself, because it is completely objective: it is a mathematical manifold. One should also avoid the mistake of thinking that the so-called ontology of the life-world would replace the epistemic ambitions of natural sciences. The former is an eidetic science, not a science of fact. It provides the a priori foundations of any empirical investigation and of any objective a priori discipline, including logic. Further, no matter how objectively we determine the invariant structure of the life-world, its intuitive natural layer remains through and through subjective-relative.

Finally, the fourth alternative is likewise incompatible with Husserl’s view of knowledge: skepticism and agnosticism are the deadly enemies of philosophy that transcendental phenomenology sets out to defeat for good.

Let us conclude by repeating that phenomenology cannot side with scientific realism either, at least under the standard understanding of latter, which presupposes metaphysical realism. To resort to the language of the *Krisis*, metaphysical realism is completely objectivist and thus fails to acknowledge the real sense of scientific truth, about which much still remains to be said.

## §12. The Life-World and the Relations Between the Naturalistic, Personalistic, and Transcendental Attitudes

The continuity just stressed with respect to Husserl’s earlier analyses concerning the task and method of natural science invites the question of

what in this respect is new in the *Krisis*. To be sure, the *Krisis* contains a reconstruction of the different stages of the mathematization of nature that adds many details to the account outlined in *Ideas II*. The most interesting aspect, however, lies elsewhere; it is rooted in the increasingly historical-genetic dimension that phenomenology takes up after the *Ideas*. In order to understand the difference between the constitution of material nature sketched in the first part of *Ideas II* and the Galileo section of the *Krisis*, we must begin from an obvious fact: the latter is a reflection on the *history* of the objectivation of material nature, revolving around a historical, personal subjectivity belonging to a tradition from which it inherits its motivations. To appreciate the importance of this fact, we must return, in the first place, to the relation between the naturalistic and personalistic attitudes as discussed in the third section of *Ideas II* and in the related supplements. It will appear that, to understand the significance of §9 of the *Krisis*, one must keep in mind the results of *Ideas II* concerning spirit and its relation to nature.<sup>164</sup> Only after acquiring clarity on this point will it be possible to understand the significance of the historical-genetic dimension of the Galileo section.

In §49e of *Ideas II*, after introducing the difference between the naturalistic and the personalistic attitudes, with their different prescientific and scientific correlates, Husserl warns the reader not to regard them as two mutually independent attitudes having equal rights.

Upon closer scrutiny, it will even appear that there are not here two attitudes with equal rights and of the same order, or two perfectly equal apperceptions which at once penetrate one another, but that the naturalistic attitude is in fact subordinated to the personalistic, and that the former only acquires by means of an abstraction or, rather, by means of a kind of self-forgetfulness of the personal Ego, a certain autonomy – whereby it proceeds illegitimately to absolutize its world, i.e., nature.<sup>165</sup>

The naturalistic attitude is *subordinate* to the personalistic attitude because it is the personal Ego that performs the operations necessary to render nature thematic as the sphere of mere natural objectivities, among which it is itself included as a “physio-psychic”<sup>166</sup> complex. This, however, requires further explanation. As Husserl says a few lines before, the everyday life of the subject, in which the subject belongs to a community sharing an *Umwelt*, takes place in the personalistic attitude, which is characterized as *natural* (“*natürliche*”), as opposed to the naturalistic attitude, which is *artificial* (“*künstliche*”).<sup>167</sup> In contrast with what happens with other artificial attitudes, notably the transcendental attitude, the naturalistic attitude, due to its one-sided, abstract character, necessarily leads to an apperception of the world affected by an *illegitimate*

absolutization of nature. Such absolutization is not something above and beyond the forgetfulness of the nexus of personal life of which the subject is a member, but its direct consequence. The naturalistic attitude turns subjectivity into a fragmented being, as we already know. The fact that an attitude, which by itself is not only legitimate but necessary for the subject to constitute a class of objectivities, is, so to speak, intrinsically dysfunctional reveals nothing less than the eidetic-transcendental roots of naturalistic objectivism. The latter is woven into the fabric of transcendental life, we could say, as a transcendental illusion.

Thus, it must be possible to describe the way in which, from the consideration of the person, one can regain access to the objectivities given in the naturalistic attitude and, so to speak, highlight that the former is a dependent and derivative attitude. This is precisely what is sketched in §52 of *Ideas II*, where Husserl, starting from the individual personal subject and its environment, builds step by step the spatiotemporal structures that belong to the shared environment of a communal personal life, nature as a stratum of this environment, and, finally, on the grounds of the opposition between normal and abnormal perception, the objective nature of mathematical physics.<sup>168</sup> At this point, Husserl proclaims, “So again, happily, we have landed in natural science, first of all in physics and then in natural science in general.”<sup>169</sup> However, Husserl is aware that this result might look rather disconcerting:

It seems that here we got into a vicious circle. For, when, at the beginning, we posited nature straightforwardly, in the way done by every natural scientist and by everyone else sharing the naturalistic attitude, and when we took human beings as realities, ones that have a *plus* above and beyond their physical Corporeality, then persons turned out to be subordinated natural Objects, component parts of nature. On the other hand, when we inquired into the essence of the person, then *nature presented itself as something constituted in an intersubjective association of persons, hence presupposing it.*<sup>170</sup>

This passage opens out onto the more detailed treatment of the spiritual world and the correlated personalistic attitude contained in Chapter 2 of the third part of *Ideas II*. However, Husserl has already provided some of the elements showing that there is no vicious circle and that priority must be granted to the personalistic attitude. One can begin to understand that the two attitudes are not symmetrical by considering that, while nature can be constituted in the “intersubjective association of persons” and, thus, as presupposing such an association, the naturalistic attitude is unable to constitute what Husserl calls *higher order personalities*, i.e., communities of personal subjects unified by the expressive unity of spiritual bonds. In nature, we find subjects with their (naturalized) “personal” life, but not associations of persons, institutions, nations, or civilizations,



nor do we find their history.<sup>171</sup> Once more, the naturalistic attitude stems from an abstraction from the pregiven world of ordinary experience, or life-world, as this passage clearly highlights.

This naturalistically considered world is of course not *the* world. Rather, given prior is the world as the everyday world, and within this arise man's theoretical interest and the sciences related to the world, among which is natural science under the ideal of truths in themselves.<sup>172</sup>

It is hard not to recognize in these lines an anticipation of the motive that will hold center stage, in a historical form, in the *Krisis*. The life-world is prior to the world of the naturalistic attitude, and, within it, we find the motivational current which, under the form of a tradition, from the rise of the theoretical interest leads to the ideal truths of science. The naturalistic attitude and its progressive application in the form of a habituality are personal accomplishments within the motivational nexus of the life-world. In order to clarify the sense of this subordination of the naturalistic to the personalistic attitude, it is appropriate to turn to a more precise characterization of the life-world and its relation to nature and spirit.

The life-world is the horizon of our practical activities, of the collective life of persons pursuing different aims individually and in association. It is also a historical world<sup>173</sup> in which everything appears with a meaning resulting from a process of sedimentation. In it, we find tools, buildings, and works of art, objects endowed with symbolic meaning, as well as persons, their social roles, and their various associations. In addition, ideas and beliefs belong here, through their role in personal life. However, as will become clear in the next section, the life-world's inclusiveness stretches even further than this, to the point that it can truly be considered all-embracing. In short, the life-world is the correlate of the natural attitude.<sup>174</sup>

Despite the different worldviews and forms of life characterizing various human cultures, such a world has invariant ontological structures which are investigated by the a priori ontology of the life-world.<sup>175</sup> The analysis of these structures reveals that everything belonging to the life-world is founded upon the stratum of material nature. All value predicates attached to the surrounding objects refer to a material substratum. Persons are localized through their living bodies, which in turn have a purely material side. For Husserl, *nature is an abstract core of the life-world*.<sup>176</sup> This core is abstract because it is obtained through an abstractive procedure Husserl calls *dismantling*, "*Abbau*,"<sup>177</sup> which sets aside all spiritual predicates and yields the "mere nature" of the physical sciences and their a priori ontology. Husserl emphasizes that the founding role of material nature does not imply its independent and absolute existence. If nature is an abstract stratum of the life-world, it cannot be ontologically

prior to it. It is an abstract layer of what for us has meaning in terms of our aims, among which its scientific explication also finds a place. Thus, the abstraction yielding mere nature is performed in view of a human aim,<sup>178</sup> which is “practical under the title of ‘theory.’”<sup>179</sup> The existence of this universal core of the life-world is what makes possible the naturalistic attitude and, based on it, natural science, which abstracts also from all sensible properties of material nature.<sup>180</sup> This nature, then, encompasses also the personal subjects under the heading of psychophysical units. It is a non-intuitive substructured nature, charged with the infinity of mathematical determinations, where also the subjects are indirectly charged with such infinity by virtue of their causal connection with material nature. Thus, the second abstraction differs in principle from the first, because it is not conducted *within* the horizon of the intuitable structure of the life-world. Its result is the in-principle non-intuitable “world” of scientific truth, which motivates objectivism and naturalism.<sup>181</sup> While the intuitive, prescientific nature of the naturalistic attitude results from a *projection* of the life-world onto its abstract material stratum, the true and objective nature of mathematical science results from the “hypothesis of being-in-itself”<sup>182</sup> that stems from the coherent unfolding of the theoretical attitude. By virtue of this hypothesis (which, in turn, implies Galileo’s hypothesis), true nature in itself becomes an idea in the Kantian sense that scientific theories try to approximate.

The result of this identification of the world with psychophysical nature is more complex and problematic than it might look at first sight. In the first place, there arises a dualism impossible to overcome between the layer of the mathematized material nature and the psyche. The latter of necessity cannot be cognized after the model of the former. This is due to the eidetic difference between things and *Erlebnisse*. An *Erlebnis* does not have spatial properties nor does it have internal causal states. Thus, it cannot be regarded as the appearance of an objective, substructured *Erlebnis* in the way in which the thing of perception is the appearance of the objective, substructured thing of physics.<sup>183</sup> In spite of this, the psyche, the states of which are the *Erlebnisse*, can be investigated through psychophysical conditionality in its causal relation with the physical world. Yet, even this dualistic inclusion in natural causality has limits explained by Husserl in detail in his refutation of psychophysical parallelism.<sup>184</sup>

In contrast with nature, the life-world is a *concrete* totality, and, in its concreteness, it can be the correlate of the personalistic attitude. Under the guidance of the theoretical ideal, the prescientific personalistic attitude becomes the personalistic attitude of the human sciences, which take as object, in their own way, all aspects of the life-world: the history of communities in their environment, languages, cultural abstract formations, political formations, concrete cultural artifacts, works of art, and, of course, human psychological life. As anticipated while discussing the *Vienna Lecture*, among the cultural formations we find all sciences:

mathematical, natural, and human. Human sciences can refer back to themselves and investigate their origin and development as cultural units, but they can also turn to the natural sciences under the headings of history, sociology, psychology, etc., of science. How can one characterize this inclusion of the natural into the human sciences?

It is the character of the human sciences to posit subjectivity as absolute, to acknowledge nature only as the intuitively existing surrounding world, or as a represented, thought, and intended surrounding world of persons, and to take mathematical Objective nature, which previously was the “true reality,” only as (what in fact it merely is) a theoretical though rational construction [“*Konstruktion*”] on the part of man as the subject of scientific activities, partially accomplished by individual persons, partially by social personalities.<sup>185</sup>

The absolute character of subjectivity here in question is not yet the absoluteness of the transcendental subject. Rather, it consists in suspending the insertion of the subject into material nature. In the personalistic attitude, though, the world is maintained as the correlate of personal life, as environment, while the nature of natural science becomes the higher order correlate of a specific type of activities of personal life, the idealizing-theoretical. The historian of science, for instance, reconstructs how a certain past community of scientists directed its theoretical interest to an aspect of natural reality, how they performed observations and experiments, and formulated theories about it. In short, the intentional life of a given personal community and its theoretical themes become the title of a correlative research. In it, the subject of the naturalistic attitude reveals itself in its real personal nature.<sup>186</sup> Furthermore, even while remaining in the naturalistic attitude, we must rely on the personal and life-worldly character of the natural scientists themselves. In a famous and extremely vivid passage of the *Krisis*, Husserl highlights the necessary personal and life-worldly character of the subjectivity at work in science by remarking that even Einstein could not refer back to Michelson’s experimental work by remaining within the boundaries of the naturalistic attitude and of its psychophysical correlates. Michelson, just as any other member of any community of researchers, had to count for Einstein as a human being experienceable in the prescientific world.<sup>187</sup>

These considerations clarify the radical asymmetry existing between the naturalistic and personalistic attitude, as well as the sense in which the former can become a theme among the correlates of the latter. There is thus no vicious circle in the mutual reference of nature and of personal subjectivity. However, the correlation between idealized nature and the community of scientists, as investigated by human sciences, manifests its fundamental one-sidedness. If objective nature counts here as a “rational

construction on the part of man as the subject of scientific activities,” its being is referred to a mundane personal subjectivity by virtue of a likewise mundane correlation. The personal subject is both a component of the life-world and the subject of the life-world along with any theoretical formation deriving from it. Human sciences remain within the natural attitude, and effect the naïf positing of transcendent realities: their correlate is *objective spirit*.<sup>188</sup> They study personal communities as objectively existing and, although they suspend the validity of the spiritual productions themselves, the level of authentic constitution remains beyond their scope.<sup>189</sup> The sense of being of the personal subject as well as its spiritual productions cannot be elucidated without the transcendental reduction. Only at this point do we finally understand the hierarchy among the naturalistic, personalistic, and transcendental attitudes and, by extension, among their respective subjects:

To personal or human science, however, does not pertain the constituting life which unfolds “in” the persons. But there is still more; human sciences, the historically descriptive and the eidetic, always have their factual (or possible) world of the spirit as pregiven, just as in the “nature”-attitude nature is presupposed. *The natural attitude in general is: to have the natural world of the spirit pregiven, and to it the nature-attitude and nature itself as theme of knowledge are subordinated.* – Now, however, I can exercise epoché; if I do so with regard to the world of the spirit, then consequently also with regard to physical nature, and then to nature in an enlarged sense, what remains? I am the Ego that has my personal Ego as a phenomenon and with it the whole personal world—And then I arrive at what is new, at absolute transcendental subjectivity and the universe of its phenomena.<sup>190</sup>

There is thus a nesting of attitudes whereby both the naturalistic and the personalistic attitudes presuppose the natural attitude. However, the former do not *branch away* from the latter independently from one another. Rather, the natural attitude posits nature and the naturalistic attitude only as subordinated to the pregiven “natural world of the spirit.” By virtue of the transcendental reduction, then, my personal subject as the center of a spiritual world becomes a phenomenon in my transcendental consciousness. To this phenomenon belong, as abstractions, both prescientific and idealized nature, which are *ipso facto* suspended. If the naturalistic attitude is, so to speak, nested in the personalistic attitude, then, the region nature, along with its material ontologies, is nested in the region spirit,<sup>191</sup> and, in a different sense, both are nested in transcendental intersubjectivity. The eidetic science of transcendental intersubjectivity, then, develops correlatively along with “an eidetics of personal possible worlds.”<sup>192</sup>

In the *Krisis*, as is well known, this movement towards transcendental subjectivity is accomplished twice, in Parts IIIA and IIIB, and in both cases along the scheme already outlined in *Ideas II*. In Part IIIA, the starting point is the concrete life-world, which, when taken as a philosophical theme, presents enigmatic features, among which two stand out. First, the life-world is, at the same time, the grounding soil of the world of scientific truth and it includes it in its concreteness.<sup>193</sup> Second, after the universal epoché of all objective validities, human beings appear at the same time as subjects for the world and objects in the world.<sup>194</sup> As we have just seen, Husserl discusses both problems in *Ideas II* while reflecting on the relation between nature and spirit and on the mundane character of the sciences of spirit. More generally, they fall under the correlative titles of *enigma of the world*<sup>195</sup> and *the paradox of subjectivity*. In *Krisis IIIA*, their solution (in reversed order) takes place, once more, by uncovering the true transcendental constituting subjectivity, which is not the human-personal,<sup>196</sup> and by elucidating on the ground of this subjectivity the multi-layered structure of the life-world in which true scientific objectivity is referred to intuited nature. This perfectly fits the programmatic definition of transcendentalism contained in §14,<sup>197</sup> as well as Husserl's earlier statements on the subject.

In *Krisis IIIB*, the starting point is, once more, the life-world, but this time the thematic structure of the life-world is the nexus of interpersonal life insofar as it can be made the object, in its own way, of an "abstraction."<sup>198</sup> Also in this case, the movement from natural to human sciences and, finally, to phenomenology is presupposed, although not foregrounded. If the human sciences absorb the natural sciences as mentioned, they all ultimately rest on humanistic (non-psychophysical) psychology, which, in turn, once correctly understood, inevitably leads into transcendental phenomenology.<sup>199</sup>

In the next two sections, I will focus on the nature of the relation between the life-world and the world of scientific truth.

### §13. The Problem of the Relation Between the Scientifically True World and the Life-World

These results allow us to address the complex relation between the life-world and what Husserl calls the "scientifically true" world. Husserl highlights the enigmatic character of this relation as follows:

The concrete life-world, then, is the grounding soil [*der gründende Boden*] of the "scientifically true" world and at the same time encompasses it in its own universal concreteness. How is this to be understood? How are we to do justice systematically – that is, with appropriate scientific discipline – to the all-encompassing, so

paradoxically demanding, manner of being of the life-world? We are posing questions whose clarifying answers are by no means obvious. The contrast and the inseparable union [we have been exploring] draw us into a reflection which entangles us in more and more troublesome difficulties. The paradoxical interrelationships of the “objectively true world” and the “life-world” make enigmatic the manner of being of both. Thus [the idea of a] true world in any sense, and within it our own being, becomes an enigma in respect to the sense of this being. In our attempts to attain clarity we shall suddenly become aware, in the face of emerging paradoxes, that all of our philosophizing up to now has been without a ground. How can we now truly become philosophers?<sup>200</sup>

The problem stated in this passage has troubled Husserl’s readers, and for good reasons. The Galileo section has provided the necessary elements to understand why, according to its sense, scientific “truth in itself” is rooted in the life-world and cannot exist outside of such rootedness. Indeed, a puzzle immediately arises: how can the intuitive, prescientific, subjective-relative life-world at the same time encompass the “scientifically true” world without ceasing to be prescientific? How can the manner of being of the life-world be, as Husserl says, all-encompassing (“*allumspannenden*”)? Until this question receives a satisfactory answer, it will remain unclear in what sense the life-world and the “scientifically true” world can legitimately cohabit, that is, the mode of being of both will remain enigmatic. Indeed, the objectivism that has determined the crisis of the European sciences resulted from the inability to recognize and reconcile the being of these “two worlds.” Inevitably, the “world” of objective truth has cancelled out the life-world.

Faced with this challenge, one could suggest that Husserl, in this passage, is simply repeating his earlier claim that scientific hypotheses and theories *qua* cultural human productions belong to the life-world.<sup>201</sup> David Carr initially envisaged this solution<sup>202</sup> but subsequently (rightly) abandoned it.<sup>203</sup> However, he did so because of what he sees as a puzzling ambiguity in Husserl’s use of the term “life-world.”<sup>204</sup> This alleged ambiguity consists in identifying the life-world both with the pregiven *perceptual world*, which is the sense-foundation of objective science, and with the *cultural world*, which includes, in addition, scientific theories and hypotheses, along with the other cultural formations involving language. According to Carr, the life-world referred to in the Galileo section “is not only prescientific in the sense of pretheoretical, but also precultural in the sense that it does not include those entities, relations, and horizons that require a linguistic community for their availability.”<sup>205</sup> As Carr reminds us, the life-world Husserl mentions in *Ideas II*, instead, was through and through a cultural world.<sup>206</sup> Thus there would seem to be a

difference between Husserl's notions of life-world in *Ideas II* and in the *Krisis*. Furthermore, Husserl in the *Krisis*, by speaking of the inclusion of cultural productions in the life-world, would not even be fully consistent with his new terminology.

As is clear from the preceding sections, I believe that there is no such ambiguity in the concept of life-world, nor any substantial shift from the time of *Ideas II*: the life-world is the full correlate of the natural attitude. The Galileo section shows that not only the pure perceptual world but also the prescientific art of measurement is part of the sense-foundation of geometry and physics, and this art is doubtlessly a cultural tradition guided by purely practical aims and involves, among other things, the use of language. The emergence of the very notion of geometric exactness is due to a transformation of the sense of the prescientific praxis of measurement and of the efforts to improve it. To be sure, it still holds true that the *ultimate* source of the conceptual material necessary for the process of idealization and co-idealization lies in the purely perceptual world. Yet, this is not surprising, since geometry is but an a priori ontology of the region material nature and physics is the empirical science correlated to it. The spatiotemporal intuitive nature, as well as the different eidetic moments of the things belonging to it, viz., spatiality, temporality, and materiality, are given prior to geometry and physics. Such nature is indeed precultural and prelinguistic, but it does not amount to the life-world, because, as we know, it is an abstract layer of it, obtained by virtue of a suspension of all cultural predicates. More generally, Husserl lays down quite explicitly the relation that nature and the cultural world bear to the life-world:

What corresponds to our particular manner of being as scientists is our present functioning in the manner of scientific thinking, putting questions and answering them theoretically in relation to nature or the world of the spirit; and [the latter are] at first nothing other than the one or the other aspect of the life-world.<sup>207</sup>

The life-world is prior to all sciences and encompasses the domains that they set out to objectify by means of their respective methods. How could the humanistic sciences perform their function if the life-world did not already include cultural formations? The humanistic sciences too are born out of the primal establishment of a scientific truth, albeit one that pertains to the domain of spirit and, thus, does not involve the substruction of idealities. This truth in itself overcomes the subjective-relative apprehension of cultural phenomena, which are pregiven in their own way.<sup>208</sup> The entire §66 of the *Krisis* underscores that the life-world “as existing prescientifically for us (originally) purely through experience, furnishes us in advance, through its invariant set of essential types, with all possible scientific topics.”<sup>209</sup> What is difficult (and this is a problem

about which it will be necessary to say more) is to work out and delineate these different topics and, more fundamentally, the different ontological regions encompassing them, through the appropriate abstractive procedures, without the interference of metaphysical presuppositions.<sup>210</sup>

The inclusion in the life-world of the cultural world along with science as a cultural formation, however, does not do justice to the paradoxical all-encompassing character that Husserl ascribes to it, because such character implies that the objective correlates of such theories, the “scientifically true” world, belong to it, too. The only way forward is to take seriously this fact and to acknowledge that it does not make sense to draw a line between what belongs to the life-world and what does not. The life-world is simply not a kind of limited ontological domain that could contain, say, stones, trees, and people but not scientists, theories, and technological artifacts, or the latter but not electrons, DNA molecules, and quasars. The life-world is not a part of a larger whole, not a layer of a supposedly “complete world” the essence of which would remain quite mysterious. Much like transcendental intersubjectivity, albeit in a different sense, the life-world *has no outside*. How, then, can the life-world be intuitively pregiven, prescientific, and subjective-relative on the one hand and all-encompassing on the other? How can it be the sense-fundament of scientific truths while including them? The key to answering these questions lies in its unique position with respect to the notion of *teleology*.<sup>211</sup> Two appendices of the *Krisis*, XVII and XIX (which were meant to supplement §33 and §34 of the *Krisis*), highlight this fact very clearly.

In appendix XVII, Husserl underscores that the life-world is the unthematic horizon of all our activities. We never make it thematic because, within this universal horizon, we are constantly engaged in the pursuit of an end, which belongs to a specific praxis characterized by a limited horizon. All human activities are hierarchically structured in view of specific highest ends.<sup>212</sup> To the teleological structure of a specific praxis there corresponds a horizon of potentialities and the related habitualities sedimented in the subjects engaged in it. In short, a praxis defines a limited “world”<sup>213</sup> with its own standard of “truth,” which nevertheless presupposes the universal horizon of the life-world. As we know, this remains the case if the praxis in question, under the heading of science, is theoretical and aims at disclosing the objective truth concerning a particular aspect of the life-world. To be sure, the teleological structure of such praxis is different, because the end that defines it is “infinitely distant” and implies the progressive construction of an edifice of theories and hypotheses. It is also different in another sense, for, ideally, the system of all such theories would express the truth concerning all aspects of the life-world.<sup>214</sup> Scientific praxis thus has its own world, a world that is, in its own way, universal. However, it shares with all other practical worlds the essential feature of existing only *as the end* of a specific praxis: the scientific truth in itself is nothing other than the end of scientific praxis and



has a sense only as its ideal correlate. Now, the radical difference between the life-world and all other “worlds,” including the “scientifically true” world, lies in the independence of the former from any specific aim.

It is clear what makes the radical distinction here. The life-world is the world that is constantly pregiven, valid constantly and in advance as existing, but not valid because of some purpose of investigation, according to some universal end. Every end presupposes it; even the universal end of knowing it in scientific truth presupposes it, in advance; and in the course of [scientific] work it presupposes it ever anew, as a world existing, in its own way [to be sure], but existing nevertheless. *The scientific world (nature in the sense of natural science, world in the sense of philosophy as universal positive science) is a purposeful structure* [“*Zweckgebilde*”] *extending to infinity – a structure [made by] men* who are presupposed, for the presupposed life-world. Now though we must [further] make evident the fact that the life-world itself is a “structure” [“*Gebilde*”], it is nevertheless not a “purposeful structure,” even though to its being, which precedes all purpose, belong men, just as we encounter them and become acquainted with them as a matter of course with all their purposes and their works, which *as developed by men, henceforth also belong as a matter of course to the life-world.*<sup>215</sup>

Paradoxical though it may sound, not only scientific theories but also nature in the sense of natural science, i.e., *nature as a mathematical manifold*, belongs to the life-world because it is an end for human praxis. At the beginning of appendix XIX (supplement to §34e, which contains the quotation opening this section), Husserl says that the scientific world *flows into* the life-world.<sup>216</sup> A few lines after that he adds, “what is aimed at, as something raised, flows into the pregiven world.”<sup>217</sup> Thus, scientific praxes are defined by the primal establishment of a being in itself, which is a *Zweckgebilde*, and, precisely under the form of a *Zweckgebilde*, flows into the life-world as the ideal correlate of such life-worldly praxes. This is what Husserl means by the inclusion of the “scientifically true” world in the life-world.<sup>218</sup>

The problem now is to understand correctly the sense of this inheritance of scientific truth in the life-world *as an end*. In order to clarify this point, let us draw from these teleological considerations some conclusions concerning the general characterization of the life-world and its relation to the “scientifically true” world. The life-world is intuitively pregiven because it is the universal horizon underlying the totality of our life. It is not prescientific because it does not “contain” the posits of scientific thought, but because, by virtue of its *teleological immobility*, its constitution is not governed by the guiding ideal of scientific truth

(nor by any other “practical” aim). Its being does not have the sense of a *telos*.<sup>219</sup> This is also the key to understanding why it is subjective-relative, “doxastic,” because its *de-subjectivation* can be pursued in the theoretical attitude only.<sup>220</sup>

If we are now to try to understand more precisely the sense in which mathematized nature, as a *Zweckgebilde*, belongs to the life-world, we must turn to the second part of the quotation opening this section. In it, Husserl indicates that addressing the enigma of the mode of being of the life-world and of the “scientifically true” world requires leaving behind a philosophy “without a ground” and “truly become philosophers.” This can only be achieved by means of the transcendental reduction, which Husserl carries out in the subsequent sections. Let us recall the image of the difference between the “life of the plane” and the “life of depth” which, adapting Helmholtz’s famous idea, Husserl had introduced in §32. The “plane” in question is that of the “natural world-life,”<sup>221</sup> which includes all objects of experience as well as all practical and theoretical ends referred to them. The philosophical solution to the problem of the relation between the life-world and the world of scientific truth conceived as one of such ends requires the exploration of the life of depth disclosed by the transcendental reduction. In other words, the “flat world” of the natural attitude, with its enigmatic duality of *doxalepisteme*, cannot be pieced together into an intelligible unity by remaining within it.<sup>222</sup>

In order to gain access to this life of depth, Husserl first operates, in §35, according to the “epoché of objective science.” Let us notice that, by virtue of the concrete and all-encompassing character of the life-world, such an epoché does not consist in nor lead to what is often referred to as “the reduction to the life-world,” and indeed Husserl never uses such an expression. Since the life-world is already there, from the outset, as a universal horizon that admits of no outside, one cannot *extract* it from a larger whole, in the way in which the natural scientist does with nature. Rather, the suspension of the scientific truth and of the interest directed at it allows Husserl to focus on the “pure life-world,”<sup>223</sup> which is a *layer* of the all-encompassing life-world. This operation is conducted in order to develop the science of its a priori structures, which comprise neither the a priori of science nor, as a matter of course, its empirical findings.<sup>224</sup> Indeed, what Husserl says is that, after the epoché of objective science, the world (intended as the concrete life-world) is “reduced to the life-world which is valid for us prescientifically,”<sup>225</sup> i.e., once more, a substructure of the concrete life-world. To be sure, this is only a step towards the *universal epoché* of the life-world and of the natural attitude correlated to it (§39), and, hence, the transcendental reduction thereby made possible (§41). Now the “pregivenness of the world as such”<sup>226</sup> can become thematic under the heading of “the transcendental correlation between world and world-consciousness.”<sup>227</sup>

#### §14. Solution to the Problem: The Teleological Inclusion of the Scientifically True World in the Life-World

Only in light of these results is it possible to supply some further clarifications on the relation between the being of scientific nature as a *Zweckgebilde* and the life-world. Husserl would have probably developed this theme in the parts of the *Krisis* he did not write. The elements in our possession, however, especially the results achieved in Chapters 3 and 4, suggest that exploring the transcendental life of depth allows us to elucidate along the following lines the unitary and all-encompassing character of the life-world.

Before the transcendental reduction, the claim that *the mode of being of scientific nature is that of an end* of a specific human praxis can sound as an absurd idealistic *hysteron proteron*. At best, from the standpoint of objective humanistic sciences which, suspending the validity of natural science, investigate scientific nature as the correlate of a certain type of personal life, one could speak of such an end as belonging to a given culture. Yet, neither the history of science nor any other humanistic discipline can address the sense of being of the correlates of personal life, the ultimate sense in which their being-in-itself is constituted in transcendental subjectivity: the enigma of the world must necessarily escape them. They, too, remain at the level of the “life of the plane.” To go beyond them, we must disclose the transcendental life unfolding “in” personal subjects and reflect on the sense of being of the life-world.

The life-world is not a “*Zweckgebilde*,” and yet its constitution, its own sense of “*Gebilde*,” just as any other constitution, presupposes the teleology of consciousness in its non-thematic, prescientific form.<sup>228</sup> We can bring this teleology to light only by exploring the “life of depth.” The intuitive things are units in an infinite multiplicity of lived experiences, but in the form of an identity, a teleological pole, which is constantly confirmed through the series of perceptual syntheses. Their being announces itself in the explication of perceptual horizons, both internal and external: as objects, they are originarily given to us, in spite of the fact that their being is never fully confirmed. When these objects are theoretically determined by mathematical physics, subjective life proceeds in the exploration of a new horizon, the specifically scientific one, which is of a different kind and is likewise governed by a different teleology. Let us recall the considerations developed in Chapter 3, §6. There is an essential difference between the categorial activities underlying experiential judgements and those underlying the theoretical judgements of the exact sciences. The former express properties and relations that are “read off” from intuited objects, while the latter lack this character not by virtue of an alleged limitation of our being but due to the essence of their correlates. The objects of exact science, what is supposed to exist in itself and be valid for all possible subjects, can never be given in experience,

never directly intuited. What Husserl adds in the *Krisis* is that the gap between these two types of judgements reflects the gap between the finite epistemic accomplishment of *doxa* and the infinite historicity of science. Scientific determination proceeds through the *historical* development of a series of theories and of methodic procedures striving to *approximate* a being in itself that is never given. The historical series of provisional theoretical determinations does not produce synthetic units, as it happens instead in the case of the different adumbrations of the same perceived object. Scientific truth is not a finite, intuitive sense that emerges as a given identifiable unit in a manifold of acts, a unit that one can express in a single judgement. Rather, each stage of the theoretical determination becomes relativized to the subsequent stage, which, in turn, only provisionally appears as the “true thing.” Scientific truth is never given, not even by adumbrations. This is the sense of its being infinitely distant. This is the case even at the simple level of a series of increasingly precise measurements of the same magnitude. The true value of the magnitude lies at the end of an infinite process of an improvement of precision, at least insofar as we are speaking of measurement in relation to mathematical idealities and not of prescientific measurement. At each new stage, the preceding determination appears only relative to the limited means of determination previously available, and the new method of determination becomes the new norm.

Husserl never developed a detailed account of the historical evolution pertaining to scientific theories. However, in a text written in 1926, he briefly discusses the way in which the invention of more and more powerful instruments of observation, such as microscopes and telescopes, produces a progressive transformation of perceptual normality whereby each stage, starting with the initial perceptual environment, is relativized with respect to the following stage. Husserl concludes, “The one true world becomes the pole of endless series of approximations of relatively true worlds.”<sup>229</sup> To be sure, in the case of the series of scientific theories, this historical process becomes much more complex and requires revisions that are much more radical than the simple refinement of a quantitative determination or the improvement of a means of observation. The history of physics has shown this all too clearly. Yet, what is essential remains the same, namely, that the substructured, infinitely distant true world in itself announces itself in consciousness only *through* the historical series of *relatively* true worlds. It manifests itself as the *telos* of a historical process, and only in this way.<sup>230</sup>

In conclusion, the particular form of inherence of idealized nature *in* the life-world can be clarified, unsurprisingly, on the basis of the notion of *synthesis*. We must first remind ourselves that the so-called scientific true world of mathematical physics is not a world at all for two reasons. First, the only true world is the life-world. Second, the “scientific true world” is only a determination of an abstract layer of the life-world,

namely, nature. The challenge is understanding the relation between this layer of the life-world and its true being in itself. This relation can only be understood along the lines indicated by Husserl in the *Ideas*. The true thing in itself and the perceived thing are the same, and the true nature in itself and the perceived nature are the same. The thing as the identical sense constituted in different perceptions, the thing as a rule for the appearances, is what is identified with an idealized thing, which is the *telos* of theoretical determination and provides an exact rule for the appearances. This identification between the correlate of an intuitive act and its theoretically substructured being in itself is a synthesis *sui generis*, which amounts to the *Urstiftung* of mathematical physics, i.e., to Galileo's hypothesis. This enduring synthesis makes intelligible the sense of the flowing in of the "scientifically true world" in the prescientific life-world. The life-worldly nature and, along with it, this entire life-world in which we constantly live remain the invariant substrate to which we attribute the ultimate truth in itself of science. Such truth constitutes itself as the *telos* of the infinite process of scientific knowledge.

Thus, the inclusion of this *telos* in the life-world, whereby the being of the latter is augmented in a unique way, is not a *real* inclusion, not an *intentional* inclusion, but, one could say, a *sui generis teleological inclusion by identification*, which, to be sure, ultimately rests on the intentional inclusion of all units of sense in transcendental consciousness. In transcendental terms, we have only replaced a vague subjective-relative rule for the appearances with an infinitely distant exact one. Even after this inclusion, the life-world remains what it is, namely, the prescientific world in which we live, for the life-world is not a prescientific world because it is not scientifically determined, but because *its worldliness is prescientific*. The life-world (i.e., the world) is given before science, and its being does not change if we discover a method for the exact determination (for the objectivation) of one of its abstract layers, a method by virtue of which the life-world harbors an infinitely distant truth in itself. We must only avoid the error of believing that this scientific truth is the "substance" of the world. This would mean turning a method designed to promote a systematic kind of objectivation of the life-world (one that, like all objectivations, results in the power of anticipating experience) into an ontology and relapsing into objectivism.<sup>231</sup>

It is now possible to go back to Husserl's famous claim that natural science casts a garb of ideas on the world. I have already indicated (see Chapter 5, §8) that this can be understood only from the transcendental attitude, and that Husserl, when he uses that famous expression, anticipates results presupposing it. The thing of perception is already an identical element intended through a multiplicity of experiences, a rule for the appearances. The identity of this thing, as an empty X, is preserved as we move to its theoretical determination. However, this X is not a hook on which we can hang either a garb of intuitive determinations or a garb of

idealized ones, for it is inseparable from intuitive determinations. Only in them is it given in person, as “a something that is perceived.” Theoretical ideas, instead, are but a garb fitted for the body of the intuitive manifestation of the X. The infinitely distant *true garb of ideas* that sciences strive to reach still presupposes the vague and subjective-relative “body” bearing such an X, and it is constantly identified with it. Thus, the fact that scientific theorizing legitimately aims at being true and yet consists “only in a garb of ideas” is puzzling only if we fail to understand the dependence of *episteme* on *doxa*, and of both on transcendental consciousness.<sup>232</sup>

### §15. Nature in Itself as a Correlate of the Infinite Historicity of the Absolute Spirit

Thanks to these results, we are now in a better position to compare the Galileo section of the *Krisis* with Husserl’s earlier treatments of the mathematical science of nature and to appreciate the gradual complication of the ensuing picture. In *Ideas I*, Husserl’s exclusive focus is the static distinction between two modalities of constitution, the perceptual and the idealizing-theoretical. What we find there is a sort of minimal formal grammar of the objectifying performances of prescientific and scientific life and of their mutual relations, the function of which is to eradicate the objectivist mistakes of the predominant realistic tendencies of the time. To this purpose, no constitutive analysis was needed, nor was a detailed account of the correlated attitude of the constituting subject needed. The first part of *Ideas II* fills this gap, though only partially, without modifying in the least the results achieved in *Ideas I*. In *Ideas II*, we find an outline of the constitution of the different layers of material nature and of their complex, essential relation to psychophysical nature, as well as a first account of the naturalistic attitude. The purpose of that analysis is to show how prescientific and scientific nature arise in the intentional performances of a subject who has taken up the naturalistic attitude. As we know, this outline, too, is preliminary in two respects (see Chapter 4, §6). First, it is not yet carried out in the transcendental attitude. It revolves around a subject that is still oblivious to the deeper levels of subjectivity that function in it. “How do *I, the natural scientist*, progressively objectify nature up to its determination as a mathematical manifold?” This is the question that Husserl is answering, imaginatively situating himself in the intentional life of the subject who lives through the naturalistic attitude and “sees” only nature. Second, this outline only partially rises to full eidetic generality. In particular, while accounting for the transition from nature as perceived by the senses to nature as determined by physical theory, Husserl’s description remains riveted to the actual existing nature and thus to empirical facts, particularly to psychophysical facts, that obtain in it and that were well known to the scientists of his time.

Husserl thus transposes himself in the *I* of the natural scientist, but of one who lives in this factually existing nature, not in any imaginable (at least to an extent) scientifically determinable nature. I have argued that this procedure does not infringe on the phenomenological method, and that such a preliminary outline can provide the basis for an eidetic-transcendental phenomenological account of the constitution of nature, as Husserl indicates in §49 of *Ideas II*.

Yet, in light of the results of this chapter, we realize that the brief indication contained in §49 of *Ideas II* fails to highlight an essential aspect of the relation between the subject of the naturalistic attitude and the ultimate subject of the transcendental attitude. Thus, the conclusion reached there, and, consequently the conclusion of Chapter 4, appears one-sided in an even more fundamental sense. In order to overcome this one-sidedness, we have turned to the third part of *Ideas II*, and most of all to Supplement XII. It has appeared that the ultimate subject that takes up the naturalistic attitude is, indeed, the transcendental, but only by first objectifying itself as a personal subject, as a member of a personal community belonging to the concrete life-world. This is the sense of the aforementioned subordination of the naturalistic to the personalistic attitude. Thus, the subject of the naturalistic attitude lives, to begin with, in the self-forgetfulness of its personal life. This was implicit from the very beginning of *Ideas II*. After all, what subject decides to focus on nature as a mere object of theoretical knowledge? Obviously, it is a person living in association with other persons and motivated by the value of scientific truth. For such a person, taking up the naturalistic attitude is a habituality to which a certain professional time corresponds as a part of the total nexus of its personal life. No matter how deep-seated, this habituality remains only a product of an original personal undertaking. The quasi-empirical approach of the first part of *Ideas II* thus appears to involve not only the reference to the factually existing nature but also to the personal life-world of which the former is the abstract core. To reformulate this claim rather vividly, the problem was not, as Ingarden believed, that those pre-transcendental analyses did not suspend the empirical facts that, say, a Helmholtz could rely on; rather, the problem was that Herr Prof. Helmholtz himself, intended as a place-holder for a personal subject who relies on such empirical facts, was omitted from the picture. Only after acquiring clarity on this point can one develop the entire theory of the constitution of nature at the transcendental level. Just as the subject of the naturalistic attitude is oblivious to its being a mundane personal subject, the latter is oblivious to the transcendental life that unfolds “in” it. Only the transcendental reduction brings to the fore this ultimate constituting subject. If we then ascend to eidetic generality, all limitations are overcome. The resulting transcendental constitution of nature in transcendental intersubjectivity will encompass not only all possible *natures* but also all possible personal worlds coordinated to them.

Furthermore, between transcendental phenomenology and the sciences of nature there lie the humanistic sciences, which, without rising to the level of constitutional analysis, nonetheless encompass the sciences of nature as spiritual formations. Insofar as they remain at the empirical level, the human scientific study of the science of nature, e.g., the history of physics, will investigate how our factually existing nature has “constituted” itself in the intentional activities of the communities of scientists belonging to our factually existing personal world. The mundane eidetics of personal worlds, instead, will investigate the different eidetic types of personal worlds. A family of such types of personal worlds will contain communities of personal subjects who are mathematical physicists, and, thus, elaborate the theoretical determination of nature by overcoming the subjective-relative character of prescientific experience. These personal worlds may be called, in an eidetic sense, “European.” As we have seen (see Chapter 5, §12), Husserl, in *Ideas II*, wonderfully highlights this fact by developing a sketchy eidetic constitution of prescientific and scientific nature from within the personalistic attitude.<sup>233</sup>

As we know, prescientific nature can only be transcendently constituted as the abstract core of the life-world, which is fundamentally personal in character. Prescientific nature is there as material for the practical goals of personal life. Consequently, it belongs to its *essence* to be such an abstract core, and it belongs to the *sense of its being* to appear only through intentional acts that are themselves but abstract components of the concrete unity of constituting life. Just as this nature cannot exist “on its own,” without being part of a life-world that encompasses personal life as well, its transcendental constitution can only be an abstract layer of the transcendental constitution of the life-world. If now we turn to the “true” nature of mathematical science, we realize that its sense includes the reference to spiritual life in a new and much more complex form. Indeed, even the third part of *Ideas II* falls short of providing a complete elucidation of the sense of being of nature, despite its insightful analysis of the relation between natural and humanistic sciences and of the already aforementioned remarks that anticipate the theme of the *Krisis* (Chapter 4, §5). Only through a transcendental conversion of the historical considerations developed in §9 of the *Krisis* can one overcome the limitations of all previous analyses.

In the *Ideas*, Husserl often refers to the thing or, more generally, to nature as described by physics as the “true” one, and he almost always uses this word in quotation marks. This is probably due to the fact that actual scientific theories only *aim* to capture true nature as it is in itself, which remains, however, an “infinitely distant” ideal pole that they can only approximate. To be sure, in principle, each ideally complete system of theories corresponds to a possible nature in itself. Yet, the verification of the adequacy of such systems to the actual nature in itself is, as we have



seen, an infinite process. This being said, there is another, more interesting reason explaining this use of quotation marks, namely, that, as we have seen, the very notion of a truth in itself is, in a very peculiar way, a hypothesis. In spite of the insistence, especially in *Ideas II*, on the motivational power of the theoretical ideal, the origin and character of the “hypothesis of truth in itself” has not been sufficiently clarified there, and the most important contribution of the *Krisis*, and of the Galileo section in particular, is to have filled this lacuna. Let us see how.

The notions of “truth in itself” and “being in itself” have an internal historicity. They are the correlates of the theoretical attitude underlying philosophy and science. Husserl’s historical considerations in *Krisis II* reconstruct the vicissitudes of such notions starting from a backward questioning motivated by our awareness that science and philosophy, in spite of the inauthentic form in which they exist now, still bear in themselves an essential reference to them. *Episteme* means the quest for truth in itself expressing being in itself. The backward questioning leads us to realize that we can grasp their sense only in opposition to the notion of the prescientific, subjective-relative truth and being given in intuition: the roots of *episteme* are in the *doxa*. If the drama of *episteme* focuses on the origin of the mathematical sciences, it is because, in those sciences, the break with prescientific intuition occurs abruptly, under the title of “exactitude.” The Galileo section, supplemented by the *Origin of Geometry*, reconstructs the fundamental stages that lead to the exactification of the material layer of the life-world: (1) creation of geometrical idealities out of the prescientific praxis of measurement, (2) birth of the art of measurement guided by geometrical idealities, (3) indirect mathematization of sensible *plena* and of causality, (4) formalization and identification of material nature with a mathematical manifold. Let us now, for a moment, set aside the way in which the sense of these stages was misunderstood in the historical-personal world in which we are *de facto* situated (i.e., the problematic of the crisis) and let us acknowledge their *eidetic necessity*. In objective terms, they belong to the *eidosis* of any life-world in which the tradition of mathematical physics has arisen. By essential necessity, any life-world is historical, and, again by essential necessity, any life-world the cultural development of which has reached the stage of the theoretical determination of nature – in short, any *European personal life-world* – must have a history comprising these stages. They thus yield a priori truths for any empirical history of science: an a priori of objective spirit.<sup>234</sup> After the transcendental reduction, the objective historical time of the life-world, the one investigated by humanistic science, is reduced to the time of the community of transcendental monads. Consequently, the stages of the objectification of nature become sedimented components of the theoretical intentional performances of a community of monads that has developed to the scientific stage, and thus carries idealized nature in the unity of a transcendental genesis, as

an idea in the Kantian sense. Consequently, both nature and the history of its science become pure phenomena in transcendental intersubjectivity, the mutual interconnections of which have already been described. If now we proceed *in contrario motu*, i.e., taking as point of departure the scientific idea of true nature in itself, we acknowledge that such nature must be the infinitely distant constitutional accomplishment of a transcendental intersubjectivity that self-objectifies itself in the form of European humanity, i.e., a humanity motivated by the theoretical ideal.<sup>235</sup> The relativity to such constituting subjectivity belongs to the *sense of scientific truth*, the genuine sense that, as we know, modern metaphysics was unable to grasp.

The required phenomenological elucidation of the “in-itself” defining the *episteme* of nature, which was missing in the *Ideas*, has finally been provided. The thesis that nature is a unit of sense in transcendental subjectivity acquires its true meaning and scope in the already quoted sentence of the *Vienna Lecture* (see Chapter 5, §2): “The universality of the absolute spirit surrounds everything that exists with an absolute historicity, to which nature is subordinated as a spiritual structure.”

In the last three sections, I showed how the insights gained in the historical and pre-transcendental Galileo section of the *Krisis* can become part of the transcendental phenomenological account of natural science, and how this later account expands on Husserl’s earlier results. I now return to the opening theme of this chapter in order to provide a final characterization of the notion of the crisis of philosophy conceived as the universal science of being culminating in metaphysics and of the way in which phenomenology can be the remedy to it.

## §16. The Life-World and the Crisis of Philosophy as the Universal Science of Being Culminating in Metaphysics

This chapter began with the picture of the great vessel of modern rationalistic philosophy sinking into the whirlpool of a dramatic crisis and carrying the positive sciences into it. As a result, the scientificity of the latter, i.e., the way they set their task and method, became questionable and their significance for life was lost. If we take up the standpoint of transcendental phenomenology, we can characterize an ideal or genuine science in the following general terms. The task of a science is the determination of an objective domain through the method appropriate to it. Since the method follows from the given objective domain, the clarification of the latter takes priority. Such clarification has two fundamental components: the delimitation of the essence of the domain and the elucidation of the sense of its being. To the side of the essence belong the material eidetic disciplines grounded in it. If this double clarification has been carried out, if the appropriate method has been developed, and if,

furthermore, the conceptual material of the theories has been elucidated, then the science in question is *genuine*. Whereas this ideal healthy state of a special science has general validity, the pathological deviations from it admit of degrees that are important to analyze. In order to do so, it is useful to contrast the situation of physics with that of psychology. This choice is justified both by their importance within the families of natural and humanistic sciences respectively and by their historical role in the narrative of the *Krisis*.

As we have seen, even mathematical physics failed to develop as a genuine science. This would have demanded that its establishment as a tradition be accompanied, from the outset, by its grounding in the life-world and, beyond that, in transcendental subjectivity. Whether this is an in-principle possibility remains a problem that Husserl does not address and that cannot be resolved *en passant*. The fact remains, though, that it did not happen. The same considerations apply to geometry, which, let us not forget, Husserl regards as a component of the a priori part of physics. Even within the framework of modern rationalism, and despite the attempts (in the wake of the Humean bankruptcy of science and philosophy) to restore the rationality of physics within a unitary philosophy, i.e., even within the philosophy of Kant and of German idealists, such science could never be genuine. According to Husserl, only within the non-objectivist universal philosophy grounded in transcendental phenomenology can sciences become genuine. This, however, does not mean that they have always been in a state of crisis. The latter implies that their scientificity has become, to say the least, questionable. This happened after Hume and until Husserl's own time. Physics offers a particularly interesting example of what one can characterize as a limited (albeit fateful) pathological deviation from genuine scientificity. With Galileo, physics has both gained a fundamental insight into the essence of material nature and developed the corresponding method. The delimitation of the essence of material nature amounts to its characterization as the spatiotemporal world of bodies. In this regional essence are rooted the ontologies corresponding to the eidetic components of a body: temporality, spatiality, and materiality, the development of which has remained, to be sure, partial. The corresponding method involves measurement and experimentation for testing theories. On the strength of this breakthrough, physics has been able to acquire the *prima facie* unquestionable scientificity (see Chapter 5, §1) and to achieve countless practical and, more importantly, theoretical results. However, since its very beginning, physics has been unable to frame the sense of being of material nature. Nature has been interpreted as a being in itself, mathematical in itself, rather than as a unit constituted in perceptual intuition for which the possibility of exact mathematical determination is a hypothesis. Thus, physics has developed as a theoretical technique. Subsequently, the crisis of modern philosophy has rendered the being of nature *enigmatic* and thus it has rendered the

rationality of the task and method of physics *questionable* and the sense of its truths *obscure*.

The situation of psychology is very different and its deviation from genuine scientificity is much more severe. Whereas the natural sciences, and subsequently also the majority of the sciences of spirit, have produced truths without their sense, psychology never developed even to the stage of a theoretical technique. Its history is a history of constant and repeated crises,<sup>236</sup> because it has always failed to recognize even the essence of its field of investigation, let alone the sense of its being. Thus, it has never understood its own task. This essence can be grasped only by understanding the intentional character of consciousness and the self-enclosed interconnected character of the world of spirit. Such a dramatic failure in framing its own domain has resulted in a total inability to acquire the corresponding method, as is attested by the history of the various attempts to develop introspective, experimental, or purely behavioral approaches.

If we now turn to the relation between these partial crises and the crisis of philosophy, and if, furthermore, following Husserl (see Chapter 5, §1), we recall that this relation crucially involves metaphysics, we must begin by stressing that the crisis of philosophy also must be understood in terms of its scientificity, i.e., in terms of its task and method. However, philosophy is not a special science, but the universal science of being, and, as I have already indicated, it cannot take up the form of a theoretical technique. Modern philosophy has interpreted this task as the construction of an objectivist system of truths, whereas Husserl's project consists in replacing such systems with a system of sciences grounded in transcendental phenomenology, i.e., in a non-objectivist first philosophy. It is now necessary to understand what fate befell metaphysics during this transformation and the way in which this fate relates to the destiny of all special sciences. Both philosophy in the modern rationalistic sense and phenomenological philosophy can be ranked under the general definition of universal science of being. Within the transition from the former to the latter, however, metaphysics modifies its nature so radically that only a partial correspondence between rationalistic metaphysics and phenomenological metaphysics is possible. The complex evolution that this term undergoes in Husserl's own thought (see Chapter 2) attests to the problematic continuity of this discipline. In light of Husserl's new ideal of philosophy, a significant part of what rationalistic metaphysics was trying to achieve must simply be abandoned. Metaphysics is not even a unitary science, the history of which can be characterized in terms of emergence, crisis, and final salvation, as physics is. This does not mean, however, that phenomenology cannot rescue at least a part of its ambitions from the wreckage of modernity. This must be the case, since, as we know, the destiny of the special sciences is inseparable from that of metaphysics.

In order to clarify this point, let us begin by recalling how Husserl characterizes the relation between metaphysics and the “intellectual hypertrophy” requiring a science of the life-world.<sup>237</sup>

From here on this much is certain: that all problems of truth and of being, all methods, hypotheses, and results conceivable for these problems – whether for worlds of experience or for metaphysical higher worlds – can attain their ultimate clarity, their evident sense or the evidence of their nonsense, only through this supposed intellectualistic hypertrophy. This will then include, certainly, all ultimate questions of legitimate sense and of nonsense in the busy routine of the “resurrected metaphysics” that has become so vocal and so bewitching of late.<sup>238</sup>

The worlds of experience are the objective domains of the special sciences, while the metaphysical higher worlds are those pertaining to teleological and theological reconsideration of the world as the totality of such objective domains. In the *Krisis*, as in general in his later work, Husserl tends to reserve the terms metaphysics for the second kind of investigation (see Chapter 2, §2.10). However, as I have already argued, one can still identify the first level with metaphysics as the ultimate science of reality and the second with metaphysics as the science of the highest and ultimate questions. Now, this phenomenological (double) sense of metaphysics only partially overlaps with rationalistic metaphysics. In order to clarify this point, I will try to show that the life-world plays a double role with respect to the discontinuous evolution of “metaphysics.” On the one hand, the disclosure of the intuitive dimension of the life-world allows for the eradication of a rationalistic metaphysics based on the notion of substance and on the demonstrative style of reasoning characterizing the controversies between realism and idealism. On the other hand, such disclosure allows the edification of the two aforementioned levels of phenomenological metaphysics. Since Descartes’ dualistic metaphysics set the agenda for all modern rationalism, the following analysis will focus on the way in which Husserl criticizes it on the basis of the notion of life-world.

The first fundamental philosophical consequence of modern physics’ forgetfulness of its own origin is the rise of Descartes’ notion of *res extensa*. If “the idea of nature as a really self-enclosed world of bodies first emerges with Galileo,”<sup>239</sup> Descartes combines this new idea with the traditional notion of substance. Galileo’s objectivist concept of nature is thus reinterpreted in light of traditional metaphysical notions. Material nature, as a substance characterized by the attribute of extension, is literally what Koyré called “the world of geometry made real,”<sup>240</sup> existing independently of human (but not divine) subjectivity – a rational, self-enclosed totality that confronts human subjectivity as an autonomous

realm, cut off from intuition and, consequently, becoming the object of a *demonstration* through the *veracitas Dei*. This conception of nature, in turn, implies the “splitting of the world”<sup>241</sup> and the opposition between material nature and the individual psyches. To be sure, Descartes characterizes subjectivity too as a substance that can exist, albeit in a modified form, independently of the *res extensa*. However, *qua* “*mens*” of the human being, it is only an element in the overall objective causality, an element that exists, *de facto*, only in conjunction with the body. Human psychic being is at once dependent and fragmented. The hypostatization of material nature, however, is less decisive in reshaping the idea of philosophy as the universal science of being than “the exemplary role of natural-scientific method,”<sup>242</sup> as a result of which the whole of being is conceived as a rational totality after the model of mathematized nature. This is the sense in which modern rationalistic metaphysics is “physicalistic.” Universal objectivist philosophy takes up the form of a “universal mathematics”<sup>243</sup> that sets out to determine the existence and essence of the different ontological domains (soul, God, and material nature) in a demonstrative framework, supplemented by the inductive methods required by the empirical subdomains of reality. Beyond that, such objectivist philosophy maintains an ability to know “what is true in itself about values and goods”<sup>244</sup> and to guide humanity towards a higher and higher level of happiness and of mastery of the surrounding world. It is obvious that Husserl, while reconstructing the motives that were bound to bring modern rationalism to its demise, does not hide its true admiration for the genuine philosophical ambition that animates it, an ambition that phenomenology must renew and salvage from its misguided presuppositions.

According to Husserl, whether in Descartes, Spinoza, or Leibniz, the being investigated by the sciences is interpreted through metaphysical substructions that result from the physicalistic demonstrative style of modern rationalism. This use of the word “substruction” is derogatory, for it highlights the modern failure to acknowledge that it is possible to elucidate such being, as well as that of God, by virtue of an intuitive method only.<sup>245</sup> “Metaphysical substruction” is not a title for beings falsely or groundlessly believed to exist, but for the objectivist misinterpretation of what really is and can be. Whereas geometrical and physical substructions are born out of a legitimate process of idealization that leads to ideal limits of intuition, which still derive from intuition their sense and full legitimacy despite the fact that they are not themselves given in it, metaphysical substructions are hypostases projected beyond the intuitive accomplishments of constituting consciousness by means of a misplaced and countersensical rationality *more geometrico*. In other words, while substructions *qua* idealizations, as we know, can aspire to be true, metaphysical substructions cannot. For instance, Galileo’s substructured mathematized nature is a legitimate hypothesis guiding scientific

research, while its objectivist interpretation turns such nature into an illegitimate *metaphysical* substruction. Now, if we focus on the way in which Descartes develops his dualistic account of the world, we realize that Galileo's objectivist interpretation of material nature is not only the origin of the notion of *res extensa* but also of his conception of the soul, of the *res cogitans*. In §§18–19 of the *Krisis*, Husserl repeats his earlier criticism of Descartes, but in a way that illuminates his indebtedness to Galileo's metaphysical self-interpretation. When Descartes, in the methodic application of his "epoché," discloses the Ego along with its *cogitationes* as an indubitable sphere of being, he wonders *what* this Ego is, and proclaims that it cannot be the entire human being, because the latter includes the body, which remains subject to doubt as much as any other component of material nature. Consequently, he identifies this Ego with the "*mens sive animus sive intellectus*,"<sup>246</sup> i.e., with the soul, conceived as what remains of the human being once one abstracts from the body.<sup>247</sup> This means that Descartes failed to acknowledge that the subjectivity he discovered, the transcendental subjectivity, is such that the entire human being, both body and soul, can have for it only the sense of pure phenomena. Husserl explains the reason for this misinterpretation in the following terms:

Is Descartes here not dominated in advance by the Galilean certainty of a universal and absolutely pure world of physical bodies, with the distinction between the merely sensibly experienceable and the mathematical, which is a matter of pure thinking? Does he not already take it for granted that sensibility points to a realm of what is in-itself, but that it can deceive us; and that there must be a rational way of resolving this [deception] and of knowing what is in-itself with mathematical rationality? But is all this not at once bracketed with the epoché, indeed even as a possibility? It is obvious that Descartes, in spite of the radicalism of the presuppositionlessness he demands, has, in advance, a *goal* in relation to which the breakthrough of this "ego" is supposed to be the *means*.<sup>248</sup>

Thus, the goal of grounding Galileo's ontology of material nature has motivated Descartes and, at the same time, misled him. An important terminological choice clearly illustrates the dependence and continuity of Descartes' conception of the soul with respect to Galileo's objectivism. Husserl characterizes both in §18 and in §19 Descartes' erroneous interpretation of the transcendental Ego as soul with the word "*Unterschiebung*" (substitution).<sup>249</sup> This is the same word that in §9h designated Galileo's fatal mistake of replacing mathematized nature for the life-world. Thus, modern metaphysical dualism derives from two fatal substitutions, life-world/nature and transcendental subject/soul, which both amount to concealing what is given in intuition with metaphysical

substructions. This fact illuminates Husserl's claim that all modern scientists are Galilean and all modern philosophers are Cartesian. It is possible to highlight the fact that the first substitution is the decisive one, i.e., that the false start of modern philosophy was due to an erroneous interpretation of the being of nature by observing that Descartes was not only unable to completely free himself from the natural attitude, but, more specifically, he remained held captive by the *naturalistic attitude* underlying Galileo's worldview. Indeed, the individual soul, conceived as what remains after abstracting from its body, is the soul of the naturalistic attitude, which underlies the psychophysical understanding of its being. The combined effect of these substitutions has set the agenda for the endless discussions about realism and idealism that have marked philosophical modernity.<sup>250</sup> Here we witness, once more, the way in which the *Krisis* provides the final development of a theme that has motivated Husserl from the beginning. We find Husserl's final word on the way in which phenomenology, as a transcendental theory of knowledge, eliminates a metaphysics of this kind, as I anticipated in Chapter 2, §5.

Physicalistic objectivism was thus crippled from the beginning by this inability to correctly deploy the transcendental motive that was present already in Descartes, i.e., to understand how knowledge of the totality of what is can be a subjective accomplishment. Here is the role assigned to the soul after Galileo reveals its inner destructive power. The paradigmatic value of the modern science of nature leads to a psychology according to which the subject is a self-enclosed reality containing ideas, or data, accessible to the inner sense.<sup>251</sup> Such a "physicalistic" view of the psyche was bound to miss the intentional character of consciousness and thus the authentic problematic of reason as the title of the subjective operations in which *what is*, whether being, value, or norm, legitimizes itself.<sup>252</sup>

The solution of the enigma of the world is what is required in order for the sciences of the world to become genuine, to become ultimate sciences of factual being. Modern metaphysical systems encompassed these sciences by encapsulating them in metaphysical substructions such as the *res extensa* and the *res cogitans*, while phenomenology refers them to ontological regions *qua* aspects of the life-world. For the former, the grounding of the metaphysical scaffolding of the world is performed through a demonstrative-inferential theory of knowledge; for the latter, the elucidation of the different ontological regions is possible only through the transcendental constitution of the life-world. As Husserl required already in his early writings, such accounts of knowledge must be free of all metaphysical presuppositions. In the *Krisis*, this is reflected in the way in which Husserl criticizes the modern misunderstanding concerning both nature and the soul/psyche. Such misunderstandings originate from the failure to elucidate the being of these domains on the intuitive ground of the life-world, without the interference of metaphysical presuppositions.



This is what Galileo did not do, and this is what Descartes, and after him, all modern philosophers, did not do. The sense of nature as a mathematical manifold can be elucidated by understanding its inclusion in the life-world, in the way I have outlined in the previous two sections. On the other hand, the even more radical failure of modern psychology is due to its inability to take its “point of departure from the manners in which souls are pre-given in the life-world.”<sup>253</sup> In this way, one would be led to the discovery of the true essence of psychic being as a unitary self-enclosed domain connecting the streams of consciousness of all co-functioning subjects, as Husserl explains in *Krisis IIIB*. On the contrary, the concept of the soul was formulated in the framework of Cartesian dualism, which presupposes, in turn, the objectivist interpretation of nature. Such a conception of the soul was a metaphysical construction for the outset<sup>254</sup> and, one should add, a higher order one with respect to Galileo’s nature. Descartes’ dualism of substances is not only ungrounded but also obviously false if seen from the vintage point of the life-world, for both material nature and the individual psyche are *abstracta*, and “*abstracta* are not ‘substances.’”<sup>255</sup>

Modern metaphysics can thus in no way be redeemed. Metaphysics was not a theoretical technique capable of producing truth in a blind way; it was through and through a dogmatic construction built upon the likewise dogmatic Galilean conception of nature. The task for a non-objectivist universal philosophy grounded in phenomenology is to revive the aspirations of such metaphysics both concerning the being of the world, as object of the special sciences, and its meaningfulness in relation to human existence. These two tasks correspond to the two levels of Husserl’s concept of metaphysics founded on transcendental phenomenology and to the related two “senses” of the world (Chapter 2, §10). The impossibility of elucidating the sense of being of the world resulting from the crisis of modern rationalism is tantamount to the crisis of the positive sciences. The impossibility of clarifying the teleological sense of the factually existing world as described by the positive sciences, the teleological sense of nature, and the cultural world, and to do so, ultimately, in relation to God as the source of such teleology, is the chief factor explaining the loss of the existential significance of the sciences. This last aspect of the crisis of philosophy is what concerns the general meaningfulness of our culture and, thus, the teleological sense that inheres in it. The concept of life-world is the key to understanding this entire problematic.

## §17. Summary and Conclusion

The title of this chapter mentions the four concepts around which the reading of the *Krisis I* have proposed revolve: life-world, philosophy, natural science, and crisis. Any attempt to spell out the numerous relations among these concepts is bound to move back and forth along the text

of the *Krisis*, as I have done throughout this chapter. Nevertheless, one must never lose sight of the internal progression of Husserl's last work, nor of the fact that it remains unfinished. This incomplete progression remains largely obscure as long as one does not clarify these concepts. One cannot understand the notion of the crisis of the European sciences as long as one identifies or conflates it with the loss of their significance for life, and even if one replaces it with its cause, which is the forgetfulness of the founding role of the life-world. The function of the life-world remains enigmatic as long as one believes that this concept is fraught with ambiguities affecting, in particular, its relation to the true world of science. The sense of Husserl's critique of Galileo is missed if one interprets it in light of contemporary debates in the philosophy of science and if, misled by such debates, one believes that such a critique diminishes in any way the epistemic ambitions of natural science. Finally, something fundamental in Husserl's conception of philosophy is lost if one does not acknowledge the role that both components of phenomenological metaphysics play in it. In particular, the one-sided insistence on the notion of "responsibility" has left little or no room for the problematic of the "highest and ultimate questions."

To be sure, responsibility plays a key role in Husserl's philosophy in general and in the *Krisis* in particular, and, according to Fink's outline, it would have received more extensive treatment at the end of the book. The elucidation of reason, in all of its components, paves the way to a humanity able to live under the guidance of reason, to justify and be responsible for all theoretical position-taking and for all personal and collective actions. In particular, the development of the normative sciences of spirit provide the guide for a responsible ethical and political life. From reason stems both the intelligibility of the world and our responsibility for how we think and act in it. However, the exclusive focus on these existential implications of Husserl's thought comes with the problem of "secularizing" a philosophy according to which, whether we like or not, reason is not only called for knowing the world, not only for determining human conduct and the genuine values that make human life genuine, but also for understanding whether the world itself, in its natural and historical facticity, *has* a value and a teleological sense. This was, as we have seen, an aspiration of modern metaphysics that Husserl tried to revive and that must be taken into account to correctly frame the sense of the crisis of philosophy and, more generally, of European culture.

The first two parts of the *Krisis* reconstructs the historical trajectory that led to the crisis of philosophy, which is, in its own way, the crisis of its scientificity. The narrative contained in *Krisis II* is, at bottom, the drama of the forgetfulness of intuition, unfolding through geometry, physics, and modern philosophy. This drama leads to objectivism and to its demise, and thus to the present state of crisis. The long analyses devoted to Galileo do not provide a phenomenological clarification of

mathematical physics, but a critical reconstruction of the decisive episode in this narrative, in which not the truth of mathematical physics but the misinterpretation of its sense is in question. To be sure, both the origin of geometry and the Galileo section detail the way in which the life-world is the sense-fundament of exact sciences. However, from the standpoint of phenomenology, this is only a preliminary account, which clarifies in an anticipatory way the sense in which scientific truth is but a garb of ideas. Their significance lies in preparing the ground for the life-world as the theme that a reborn, truly scientific, non-objectivist philosophy should take as its point of departure. Once the necessity of this inquiry into the life-world becomes manifest, we face the challenge of understanding how the true world of science “fits into” the life-world. This is the authentic phenomenological, constitutive problematic, one of course that requires the transcendental reduction. Without clarity on this point, the oft-repeated thesis that scientific idealizations have their source in the life-world does not completely eradicate objectivism. The temptation to interpret all the stages leading to the idealization of nature as so many methodological steps towards the discovery of a true world in itself, existing independently of subjectivity, will persist. The pre-transcendental “discovery” of the life-world in *Krisis II* as the sense-fundament of scientific knowledge, instead, has the effect of making visible the enigma of the relation between the life-world and the scientifically true world. What is the relation between these two “worlds”? Only the theory of transcendental constitution can answer this question. In the extant part of the *Krisis*, Husserl has not directly addressed it. He has only prepared the ground for it in *Krisis IIA*. I have tried to fill this gap by sketching an account of the relation between the life-world and scientific truth grounded in Husserl’s earlier analyses of mathematical physics yet including the novelties introduced by the historical and genetic approach of the *Krisis*. According to such an account, by virtue of a unique form of synthesis, the life-world includes in its concreteness, as a *telos*, the scientific truth in itself. The life-world is not only the sense-fundament of scientific truth, it also harbors it in its concreteness by virtue of an internal teleological “infinetization” of its own being. Thus, no ambiguity affects the notion of an intuitive, prescientific life-world that nevertheless also encompasses scientific truth. Furthermore, based on the necessary subordination of the naturalistic attitude to the personalistic attitude introduced in *Ideas II*, the infinitely distant goal of true nature in itself appears as the correlate of an infinitely developing transcendental intersubjectivity that self-objectifies in an infinitely developing European humanity. This is the final form of the relativity of the sense of natural-scientific truth to transcendental intersubjectivity. This result provides, in outline, an example of the way in which a science can acquire the status of ultimate knowledge of factual reality by means of the transcendental elucidation of its grounding in the life-world, and, thus, how its crisis is overcome.

Finally, I have stressed the general connection between the life-world and Husserl's project to replace rationalistic metaphysics with a metaphysics grounded in transcendental phenomenology. Both the demonstrative method and the ontological notions of rationalistic metaphysics (such as "substance," "idealism," "realism") appear to derive from the objectivist misinterpretation of nature and spirit. The objective domain of the sciences must be elucidated in a purely intuitive way as stemming from the ontology of the life-world. In this way, the transformation of all sciences in ultimate knowledge of factual reality is assured and the intelligibility of the world reestablished. This paves the way to the teleological reconsideration of the factually existing life-world and, thus, to the investigation of its ultimate significance for our existence.

## Notes

1. On the complex and interesting vicissitudes connected to the genesis of Husserl's last work, see Moran 2012, pp. 40–44. While Ingarden has downplayed the interest of this work (Ingarden 1972), Majolino (2008a, pp. 19–21) has highlighted the fruitfulness of Husserl's new way of introducing the most important themes of his philosophy.
2. Trizio 2016. It is useful to recall that, by developing his crisis-concept, Husserl was following what was, at that time, a fashionable trend among German-speaking intellectuals. See Graf 2010 for an extremely interesting analysis of this cultural phenomenon.
3. "A crisis of our sciences as such: can we seriously speak of it? Is not this talk, heard so often these days, an exaggeration? After all, the crisis of a science indicates nothing less than that its genuine scientific character [*ihre echte Wissenschaftlichkeit*], the whole manner in which it has set its task and developed a methodology for it, has become questionable [*fraglich*]" (*Krisis*, p. 3).
4. Indeed, the very first lines of §2 signal that Husserl is moving in a direction other than that of a direct analysis of the scientificity of positive sciences. "It may be, however, that motives arise from another direction of inquiry – that of the general lament about the crisis of our culture and the role here ascribed to the sciences – for subjecting the scientific character [*Wissenschaftlichkeit*] of all sciences to a serious and quite necessary critique without sacrificing their primary sense of scientific discipline, so unimpeachable within the legitimacy of their methodic accomplishments" (*Krisis*, p. 5). To my knowledge, only Patočka has paid attention to this subtlety (Patočka 2015, p. 21), and, thus, to the fact that §2 of the *Krisis* does not yet contain Husserl's own definition of the crisis of European sciences. This has been missed in several interpretations that either identify the crisis of European sciences with their loss of meaning for life or do not clarify the differences and mutual relations between these two phenomena, see Stein 1937, p. 327; Gurwitsch 1956, p. 383; Paci 1972, p. 3; Bohem 1979, p. 27; Ströker 1988, p. 207, 1992, p. 107; Carr 1974, p. 46, 2010, p. 86; Bernet, Kern and Marbach 1993, pp. 220–225; Dodd 2004, pp. 29–30. A better characterization of the crisis of philosophy in general is in Ströker 1996, p. 319.
5. "If man becomes a 'metaphysical' or specifically philosophical problem, then he is in question as a rational being; if his history is in question, it is a matter of the 'meaning' [*Sinn*] or reason in history. The problem of God clearly

contains the problem of ‘absolute’ reason as the teleological source of all reason in the world – of the ‘meaning’ of the world [*Sinnes der Welt*]. Obviously even the question of immortality is a question of reason, as is the question of freedom. All these ‘metaphysical’ questions, taken broadly – commonly called specifically philosophical questions – surpass the world understood as the universe of mere facts. They surpass it precisely as being questions with the idea of reason in mind. And they all claim a higher dignity than questions of fact, which are subordinated to them even in the order of inquiry. Positivism, in a manner of speaking, decapitates philosophy. Even the ancient idea of philosophy, as unified in the indivisible unity of all being, implied a meaningful order of being and thus of problems of being. Accordingly, metaphysics, the science of the ultimate and highest questions, was honored as the queen of the sciences; its spirit decided on the ultimate meaning [*Sinn*] of all knowledge supplied by the other sciences” (*Krisis*, p. 9).

6. The most important component of the significance of the sciences for life is, thus, metaphysical. However, Husserl also mentions the scientist’s “*Erkenntnisfreude*” (Hua XXVII, p. 84) and the practical application of scientific knowledge. Still, without a scientific philosophy, “cognitive joy” cannot be really achieved, and the technical reshaping of our environment cannot take place under the guidance of a genuine ethical science.
7. Husserl considers Spinoza’s thought rather problematic in this respect and obviously sympathizes more with the philosophy of Leibniz, see Hua Mat IX, pp. 424–467.
8. *Krisis*, pp. 10–11.
9. The fact that the crisis of philosophy itself must be understood in terms of its scientificity is overlooked by Heffernan in his response to my 2016 article on the crisis-concept. His interpretation rests, at bottom, on the erroneous claim that “The *Krisis* of European philosophy consists in the loss of its meaningfulness for life” (Heffernan 2017, p. 254). Philosophy, too, must be a science, and questions concerning existential meaning belong to its scientific domain of investigation. A philosophy in crisis, i.e., a philosophy whose scientificity is (to say the least) questionable, cannot be meaningful for life because it cannot address existential questions in a scientific way. Furthermore, as we have seen, without the rational grounding in a genuinely scientific philosophy, the special sciences can only have a positive, unphilosophical scientificity, and cannot be genuine sciences. Thus, they are bound to be in crisis. Finally, in the absence of a genuine philosophy dealing with existential questions, they also lose their meaningfulness for life.
10. The introduction of *Formal and Transcendental Logic* contains the same account of the “unphilosophical character of this positivity” of the sciences, but not the term “crisis” (see Hua XVII, pp. 17–18; 1969, p. 13).
11. *Krisis*, p. 89. The title itself of *Krisis I* encapsulates the sense of these considerations: *The Crisis of the Sciences as Expression [Ausdruck] of the Radical Life-Crisis of European Humanity*.
12. *Krisis*, pp. 397–400.
13. *Krisis*, p. 400. Of course, we cannot be certain that Husserl would have actually followed the outline suggested by Fink, but what is certain is that Fink’s proposal is fully coherent with Husserl’s philosophical project as I have reconstructed it in this book.
14. Hua VI, pp. 318, lines 18–32.
15. *Krisis*, p. 270.
16. *Krisis*, p. 272.
17. *Krisis*, pp. 272–273.

18. *Krisis*, p. 273.
19. *Ideas II*, p. 191.
20. As we have seen, in the psychophysical domain, there is a peculiar form of causality that Husserl calls *conditionality*.
21. "Instead of the causal relation between things and men as natural entities, there is substituted the *relation of motivation* between persons and things . . . Thus it is from the things which, in terms of consciousness of the personal Ego, are meant as actually existing that 'stimuli' arise" (*Ideas II*, p. 199).
22. *Ideas II*, p. 199.
23. *Krisis*, p. 276.
24. *Krisis*, p. 278.
25. *Krisis*, p. 278.
26. *Krisis*, p. 284.
27. *Krisis*, p. 287.
28. *Krisis*, p. 289.
29. *Krisis*, pp. 290–291.
30. *Krisis*, p. 292.
31. *Krisis*, p. 294.
32. *Krisis*, p. 296.
33. *Krisis*, p. 295.
34. *Krisis*, p. 297.
35. *Krisis*, p. 298.
36. *Krisis*, p. 299.
37. *Krisis*, p. 343.
38. *Krisis*, p. 344.
39. *Krisis*, p. 344.
40. *Krisis*, p. 344.
41. *Krisis*, p. 344.
42. *Krisis*, p. 344.
43. *Krisis*, p. 345.
44. *Krisis*, p. 345.
45. *Krisis*, p. 348.
46. On this notion, and on its relation to the static and genetic methods, see Steinbock 1995, pp. 79–85.
47. *Krisis*, p. 345.
48. *Krisis*, p. 347.
49. *Krisis*, p. 350.
50. For a detailed and illuminating analysis of Husserl's view of Greek philosophy, see Majolino 2018.
51. *Krisis*, pp. 21–22.
52. *Krisis*, p. 22.
53. *Krisis*, p. 22.
54. *Krisis*, pp. 22–23.
55. *Krisis*, p. 23.
56. *Krisis*, p. 23.
57. Hua Mat IX, p. 195.
58. *Krisis*, p. 23.
59. *Krisis*, pp. 23–24.
60. "Science is confronted with the problem of that which is, as the real which exists in itself, existing in itself over against the multiplicity of subjective manners of givenness belonging to the particular knowing subject" (*Krisis*, p. 301).
61. *Krisis*, p. 308.

62. "Ontology of nature 'in itself': what is necessary for a nature in general, the necessary form, the ideal essence, of a nature and the necessary forms of determinations of every individual which *idealiter* and 'in itself' can belong to nature. Such considerations of the pure idea are accomplished by the sciences of the pure mathematics of nature" (*Krisis*, p. 305).
63. On the genesis of §9, see Moran 2012, pp. 71–74.
64. *Krisis*, p. 25.
65. *Krisis*, p. 25.
66. *Krisis*, p. 314.
67. *Krisis*, p. 25.
68. *Krisis*, p. 27.
69. *Krisis*, p. 312.
70. *Krisis*, p. 25.
71. "Practically speaking there is, here as elsewhere, a simple perfection in the sense that it fully satisfies special practical interests" (*Krisis*, p. 25).
72. On the relativity and practice-dependent character of prescientific truth, see Luft 2004, pp. 201–204. On the life-world in general, see Luft 2011; Moran 2015.
73. *Krisis*, p. 26.
74. *Krisis*, p. 26.
75. *Krisis*, p. 26.
76. *Krisis*, p. 358.
77. *Krisis*, p. 358.
78. *Krisis*, p. 358.
79. *Krisis*, p. 361.
80. *Krisis*, p. 361.
81. *Krisis*, p. 361.
82. *Krisis*, p. 27.
83. *Krisis*, p. 27. As elsewhere, some parts of this quotation are italicized in the German text, but not in the English translation. In this case, it is useful to reproduce the original form.
84. *Krisis*, p. 28.
85. *Krisis*, p. 27.
86. *Krisis*, p. 25.
87. "The art of measurement thus becomes the trail-blazer for the ultimately universal geometry and its 'world' of pure limit-shapes" (*Krisis*, p. 28).
88. On the philosophical character of Husserl's Galileo, see Moran 2012, pp. 67–68. It is also noteworthy that, in the *Origin of Geometry*, Husserl also defines the "first inventor" of geometry as a philosopher (*Krisis*, p. 376).
89. *Krisis*, p. 27.
90. *Krisis*, p. 344.
91. See *Ideas II*, p. 313.
92. *Ideas I*, p. 166.
93. *Krisis*, p. 33.
94. *Krisis*, p. 28.
95. *Krisis*, p. 33.
96. *Krisis*, p. 33. My emphasis.
97. *Krisis*, p. 33. It is worth recalling that Du Bois-Reymond characterized physics as an astronomical knowledge of the material world.
98. *Krisis*, p. 34.
99. *Krisis*, p. 35.
100. *Krisis*, p. 35.

101. *Krisis*, p. 35.
102. *Krisis*, p. 37.
103. *Krisis*, p. 37.
104. *Krisis*, p. 36.
105. *Krisis*, p. 37.
106. *Krisis*, p. 38.
107. *Krisis*, p. 38.
108. *Krisis*, p. 39.
109. "As a discoverer, Galileo went directly to the task of realizing his idea, of developing methods for measuring the nearest data of common experience" (*Krisis*, p. 40).
110. "This universal idealized causality encompasses all factual shapes and plena in their idealized infinity" (*Krisis*, p. 39).
111. *Krisis*, pp. 41–42.
112. On this point, Aron Gurwitsch's remarks are extremely clear: "If, as Husserl does, one calls it a 'hypothesis,' one must, following him, emphasize its peculiar nature. One may speak of it as the 'hypothesis underlying hypotheses,' as a 'regulative idea' in the sense of Kant, as a methodological norm which directs the formulation of scientific hypotheses and guides all scientific activities, theoretical and experimental alike. A 'hypothesis' of this kind cannot be defended by direct argument but can be substantiated only by the continuing success of the methodological norm itself. And this means ongoing never ending work. The thesis that nature is mathematical throughout can be confirmed only by the entire historical process of the development of science, a steady process in which nature comes to be mathematized progressively" (Gurwitsch 1974, p. 55).
113. *Krisis*, p. 42. The complexity of this peculiar kind of convergence is immediately stressed by Husserl but also set aside since it does not pertain to the sense of his analysis to clarify the particular epistemological problems arising from positive science.
114. Husserl will then repeat at the end of the *Krisis* that the world itself is a hypothesis that cannot be grounded in the same way scientific hypotheses are (*Krisis*, p. 261).
115. *Krisis*, p. 43.
116. *Krisis*, pp. 43–44.
117. "Superficialization" translates "*Veräußerlichung*," which literally means "externalization." This choice of the translator however nicely conveys the idea that sense undergoes a loss of, so to speak, intuitive depth.
118. *Krisis*, p. 44. My emphasis.
119. *Krisis*, p. 44.
120. "This process of method-transformation, carried out instinctively, unreflectively in the praxis of theorizing, begins in the Galilean age and leads, in an incessant forward movement, to the highest stage of, and at the same time a surmounting of, 'arithmetization'; it leads to a completely universal 'formalization'" (*Krisis*, p. 45).
121. *Krisis*, p. 45.
122. *Krisis*, p. 45.
123. *Krisis*, pp. 45–46.
124. *Krisis*, pp. 46.
125. *Krisis*, p. 46.
126. *Krisis*, p. 47. Note that the world is here evoked in its essential singularity.
127. *Krisis*, p. 48.
128. *Krisis*, p. 47.



129. *Krisis*, p. 47. Of course, they will avail themselves only of the limited part of the *mathesis universalis* that has been developed thus far.
130. *Krisis*, p. 48.
131. *Krisis*, p. 48.
132. *Krisis*, pp. 48–49.
133. *Krisis*, p. 49.
134. *Krisis*, p. 49.
135. *Krisis*, p. 366.
136. *Krisis*, p. 366.
137. *Krisis*, p. 366.
138. *Krisis*, p. 367.
139. *Krisis*, pp. 49–50.
140. This opposition is overlooked by many of Husserl's readers, but not by Majolino (see Majolino 2018, p. 172 n9). On Galileo's relation to Plato see also Seidengart 2019, which develops an interesting comparison between Husserl's and Cassirer's conceptions of the mathematization of nature.
141. Let us stress that the sense of Husserl's theory of idealization is not to revert, against Galileo, to Plato's notion of methexis.
142. *Krisis*, p. 50.
143. *Krisis*, p. 50.
144. *Krisis*, pp. 50–51.
145. *Krisis*, pp. 51.
146. *Krisis*, pp. 50–51.
147. *Krisis*, p. 50. My emphasis.
148. *Krisis*, p. 54.
149. *Krisis*, p. 56.
150. *Krisis*, p. 57.
151. *Krisis*, p. 57. My emphasis.
152. On this point, see also Hopkins 2011, pp. 83–94.
153. *Krisis*, pp. 57–58.
154. *Krisis*, p. 58.
155. *Krisis*, p. 58.
156. *Krisis*, p. 58.
157. *Krisis*, p. 59.
158. *Krisis*, p. 378.
159. *Krisis*, p. 378.
160. See, for instance, Hua XXVII, pp. 6–7.
161. *Krisis*, p. 18.
162. Other a priori components derive from the theory of attitudes and from the a priori account of the emergence of the theoretical attitude.
163. *Krisis*, p. 18.
164. This was already noted by Carr (1970, p. 332).
165. *Ideas II*, p. 193.
166. *Ideas II*, p. 192.
167. *Ideas II*, p. 192.
168. *Ideas II*, pp. 217–218.
169. *Ideas II*, p. 218.
170. *Ideas II*, p. 220. My emphasis.
171. The associations of psychophysical beings within the naturalistic attitude do not give rise to any new type of objectivity (*Ideas III*, pp. 17–18).
172. *Ideas II*, p. 219.
173. Hua XXXIX, pp. 335–349. *Krisis*, p. 227.
174. “The life-world is the natural world” (*Ideas II*, p. 385; cf. *Krisis*, p. 145).

175. *Krisis*, §51.
176. Hua XXXIX, pp. 259–306.
177. Hua XXXIX, p. 265.
178. Hua XXXIX, pp. 326–327.
179. *Krisis*, p. 131.
180. Ullrich Melle expresses this situation in the following way: “Thus the nature of modern natural science is abstract to a higher power. First, intuitive mere nature is already an abstract ground stratum of concrete, life-worldly experience and practice. Modern natural science then in a second abstraction tries to determine nature in itself out of this abstract ground stratum of intuitive nature” (Melle 1996, p. 26). See also on this point Staiti (2014, pp. 261–263), who describes in detail the consequences of this abstraction for the world of values.
181. “This already involves a naturalism insofar as this concept is taken from Galilean natural science, such that the scientifically ‘true,’ the objective, world is always thought of in advance as nature, in an expanded sense of the word” (*Krisis*, p. 127).
182. *Krisis*, p. 131.
183. “The psychic, considered purely in terms of its own essence, has no [physical] nature, has no conceivable in-itself in the natural sense, no spatiotemporally causal, no idealizable and mathematizable in-itself, no laws after the fashion of natural laws; here there are no theories with the same relatedness back to the intuitive life-world, no observations and experiments with a function for theorizing similar to natural science – in spite of all the self-misunderstandings of empirical, experimental psychology” (*Krisis*, p. 222). A few lines later, Husserl adds, “An ‘exact’ psychology, as an analogue to physics (i.e., the dualistic parallelism of realities, of methods, and of sciences), is an absurdity” (*Krisis*, p. 223).
184. This psychophysical nature, partly mathematized, partly non-mathematizable, has then become the playground of much contemporary philosophy of mind and its attempted solutions to the so-called mind-body problem. Among such attempted solutions, one should rank the limiting and extreme thesis of materialistic eliminativism, anticipated, in the modern era, by Thomas Hobbes’ materialistic psychology. Husserl, of course, regarded any such purely materialistic psychology as totally absurd.
185. *Ideas II*, p. 374.
186. “The human scientist thus goes back precisely one level, back to the subject which investigates nature and so to any subject operative either rationally or irrationally” (*Ideas II*, pp. 376).
187. *Krisis*, pp. 125–126.
188. “For the attitude of the humanistic sciences the point of departure is the ‘natural attitude,’ in which everyone, and thus also the beginning humanist, is situated in waking life prior to all scientific intent and activity and through which he can find himself to be such” (*Krisis*, p. 321).
189. “But the historical, concretely descriptive, human sciences hold fast to experience and its experiential unities and are in no need of a phenomenological-psychological reduction as a rigorous method; they do not aim at ultimate, constitutive, elementary analyses, elementary essential laws of intentionality, and the ultimate human-scientific ‘explanation’” (*Ideas II*, pp. 377–378).
190. *Ideas II*, p. 380 (footnote). My emphasis.
191. This passage clarifies the very definition of the natural attitude. The correlate of the natural attitude is the entire life-world.

192. *Ideas II*, p. 379.
193. *Krisis*, p. 131.
194. *Krisis*, p. 180.
195. For a general discussion of this problem, see de Warren 2008.
196. *Krisis*, p. 183.
197. *Krisis*, p. 69.
198. *Krisis*, §66.
199. *Krisis*, p. 259. On the philosophical preeminence of the humanistic sciences over the natural sciences and on the way in which the former lead to transcendental phenomenology, see Staiti's extensive treatment (Staiti 2014, pp. 170–221).
200. *Krisis*, pp. 131–132. See also *Krisis*, pp. 380–381, 383. We find a similar formulation also in §10 of *Experience and Judgment*: “The sense of this pregivenness is such that everything which contemporary natural science has furnished as determinations of what exists also belongs to us, to the world, as this world is pre-given to the adults of our time” (Husserl 1973, p. 42). However, what is emphasized there is the objectivist misunderstanding of exact scientific truth rather than its specific inclusion in the life-world.
201. *Krisis*, p. 130.
202. Carr 1970, p. 335.
203. Carr 1974, p. 192.
204. Carr 1974, pp. 194–200.
205. Carr 1974, p. 195.
206. Carr 1974, pp. 196–198.
207. *Krisis*, p. 110. On this point, see also Gander 2010, p. 185.
208. *Krisis*, p. 318.
209. *Krisis*, p. 226.
210. *Krisis*, p. 227.
211. See Kern 1979, pp. 73–76, for a clear but sketchy analysis of this point.
212. *Krisis*, p. 379.
213. *Krisis*, p. 379.
214. Husserl refers to the aim of a total scientific system as “a theory contained in an ideal text book” (*Krisis*, p. 380).
215. *Krisis*, p. 382. My emphasis.
216. Hua VI, p. 466.
217. Hua VI, p. 466.
218. The process of “flowing into” [*Einströmen*], whereby the achievements of science “migrate” into the life-world, also affects our everyday activities and transforms our ordinary relationship to the surrounding objects and the linguistic comportment towards them (*Krisis*, p. 138, footnote, pp. 209–210; Hua VI, p. 466; see Held 2003, pp. 59–61). In our time, we are more than accustomed to recognize technological devices and measurement instruments of various kinds, as well as to group entities into types that are ultimately definable in scientific terms. Our surrounding world has indeed been deeply transformed by this process. However, the *Einströmen* in the eminent sense concerns the scientific world in itself. Once this is understood, the fact that at the grocery we normally speak of proteins, carbohydrates, and vitamins appears as rather unimportant and should not raise any interpretative concern as to the coherence of the notion of life-world. Accordingly, in light of the inclusion of the world of scientific truth in the life-world, there is no need to distinguish the life-world as the pre-scientific sense-fundament of science from the life-world as the surrounding world of what is taken for granted, which can also be loaded with scientific

- predicates. (As is done in Drummond 2007, p. 122.) The notion of life-world is not affected by such ambiguity either.
219. This holds true so long as finite subjects are taken into consideration. It is only by reconsidering the world from a theological point of view, i.e., by developing the highest metaphysical problems, that its very being might appear as a practical good for a creator (Hua Mat IX, p. 187).
  220. For an insightful analysis of the pregivenness of the life-world, see Dodd 2004, pp. 151–156. It is doubtful, however, that the original givenness of the world can be characterized as having the form of a *question* (Dodd 2004, pp. 155, 158). The life-world is originally teleologically indifferent, and it becomes a source of questions only after the rise of the theoretical attitude, which, so to speak, lights up the life-world with a specific teleological coloration.
  221. *Krisis*, p. 119.
  222. Actually, without the constituting life of depth, it cannot even hold together.
  223. *Krisis*, p. 139.
  224. Also, this pure life-world obtained through the epoché of objective science does not introduce any ambiguity into the concept of life-world as it is sometimes claimed (see, for instance, Christensen 2012, p. 217), because it is only the fundamental layer of the concrete life-world as the correlate of the natural attitude. In subsection 34f, Husserl introduces this distinction very clearly: “Thus in any case, for the sake of clarifying this and all other acquisitions of human activity, the concrete life-world must first be taken into consideration; and it must be considered in terms of the truly concrete universality whereby it embraces, both directly and in the manner of horizons, all the built-up levels of validity acquired by men for the world of their common life and whereby it has the totality of these levels related in the end to a world-nucleus to be distilled by abstraction, namely, the world of straightforward intersubjective experiences” (*Krisis*, p. 133). This world-nucleus (“*Weltkern*”) is the pure life-world to which everything encompassed by the concrete life-world relates. Let us also add that this world-nucleus includes both the prescientific nature and the prescientific world of spirit.
  225. *Krisis*, p. 147.
  226. *Krisis*, p. 141.
  227. *Krisis*, p. 151. For the distinction between a life-world ontology carried out in the natural attitude and a “*transcendental* analysis of the life-world,” see Steinbock 1995, pp. 95–96.
  228. See, for instance, Hua III/2, p. 549; Hua IX, p. 254; Hua XIV, p. 248.
  229. Hua XXXIX, p. 659. See Trizio 2018 for more detailed analysis of the theme of teleology in Husserl.
  230. Again, paradoxical though it might seem, prescientific relative truth is *de facto* surpassed not by objective truth but by scientifically relative truth.
  231. Similar teleological considerations apply to the truth the humanistic sciences strive to achieve. The significant difference, though, lies in the fact that such disciplines do not idealize their objects and thus do not require the kind of synthesis that is at work between the intuitive substrates of prescientific judgements and the idealized non-intuitive substrates of natural-scientific hypotheses.
  232. I believe that these conclusions can pave the way to a correct understanding of Husserl’s famous claims about the immobility of the “originary earth”.
  233. Thus, scientific facts pertaining to nature must first be understood as posited by a personal community and, only subsequently, as pure phenomena.

- “It is not the sciences of nature but the human sciences that lead into the ‘philosophical’ depths; for the philosophical depths are the depths of ultimate being” (*Ideas II*, p. 376).
234. They thus provide examples of the historical a priori mentioned in Chapter 5, §10.
235. “The world can only be if it develops constitutively, if absolute subjectivity develops the world, so that it develops to self-consciousness in human form, and further develops to scientific self-consciousness. Without tendency to truth there is no truth, without development to knowledge there is no true being” (Hua XIV, p. 136).
236. *Krisis*, p. 212. See also Hua VI, p. 356.
237. On Husserl’s science of the life-world, see Sowa 2010.
238. *Krisis*, p. 133.
239. *Krisis*, p. 60.
240. Koyré 1943, p. 404. The conception of nature of the historical Galileo still contained some traces of the traditional notion of the four elements. See De Gandt 2004, p. 194.
241. *Krisis*, p. 60.
242. *Krisis*, p. 60.
243. *Krisis*, p. 73.
244. *Krisis*, p. 66.
245. For Husserl’s use of the expression “metaphysical substraction,” see Hua VII, pp. 105, 235–236, 349. See also Hua IX, pp. 193, 253, 526, 535.
246. *Krisis*, p. 79.
247. *Krisis*, p. 80.
248. *Krisis*, p. 79.
249. “For Descartes, the *Meditations* work themselves out in the portentous form of a substitution of one’s own psychic ego for the [absolute] ego, of psychological immanence for egological immanence, of the evidence of psychic, ‘inner,’ or ‘self-perception’ for egological self-perception; and this is also their continuing historical effect up to the present day. Descartes himself really believes he is able to establish the dualism of finite substances by way of inferences to what transcends his own soul, mediated through the first inference to the transcendence of God” (*Krisis*, p. 81).
250. See *Krisis*, pp. 262–263.
251. *Krisis*, p. 85.
252. *Krisis*, p. 83.
253. *Krisis*, p. 211.
254. *Krisis*, p. 212.
255. *Krisis*, p. 229.

## Bibliography

- Bernet, R., Kern, I. and Marbach, E. (1993). *An Introduction to Husserlian Phenomenology*. Evanston, IL: Northwestern University Press.
- Bohem, R. (1979). Husserl’s drei Thesen über die Lebenswelt. In: E. Ströker, ed., *Lebenswelt und Wissenschaft in der Philosophie Edmund Husserls*. Frankfurt am Main: Vittorio Klostermann, pp. 23–31.
- Carr, D. (1970). Husserl’s problematic concept of the life-world. *American Philosophical Quarterly*, 7(4), pp. 331–339.
- Carr, D. (1974). *Phenomenology and the Problem of History*. Evanston, IL: Northwestern University Press.

- Carr, D. (2010). The crisis as philosophy of history. In: D. Hyder and H. Rheinberger, eds., *Science and the Life-World*. Stanford: Stanford University Press, pp. 83–99.
- Christensen, C. (2012). The world. In: S. Luft and S. Overgaard, eds., *The Routledge Companion to Phenomenology*. London and New York: Routledge, pp. 211–221.
- De Gandt, F. (2004). *Husserl et Galilée*. Paris: Vrin.
- De Warren, N. (2008). *La crise de la raison et l'énigme du monde*. In: C. Majolino and F. De Gandt, eds., *Lectures de la Krisis de Husserl*. Paris: Vrin, pp. 23–44.
- Dodd, J. (2004). *Crisis and Reflection: An Essay on Edmund Husserl's Crisis of the European Sciences*. Dordrecht: Kluwer.
- Drummond, J. (2007). *Historical Dictionary of Husserl's Philosophy*. Lanham: Scarecrow Press.
- Gander, H. (2010). *Husserl-Lexikon*. Darmstadt: Wissenschaftliche Buchgesellschaft.
- Graf, R. (2010). Either-Or: The Narrative of 'Crisis' in Weimar Germany and in Historiography. *Central European History*, 43(4), pp. 592–615.
- Gurwitsch, A. (1956). The last work of Edmund Husserl. *Philosophy and Phenomenological Research*, 16(4), pp. 380–399.
- Gurwitsch, A. (1974). *Phenomenology and the Theory of Science*. Evanston, IL: Northwestern University Press.
- Heffernan, G. (2017). The concept of Krisis in Husserl's the crisis of the European sciences and transcendental phenomenology. *Husserl Studies*, 33(3), pp. 229–257.
- Held, K. (2003). Husserl's phenomenology of the life-world. In: D. Welton, ed., *The New Husserl*. Bloomington: Indiana University Press, pp. 32–62.
- Hopkins, B. (2011). *The Origin of the Logic of Symbolic Mathematics*. Bloomington and Indianapolis: Indiana University Press.
- Hua III/1. Husserl, E. (1976). *Ideen zu einer reinen Phänomenologie und phänomenologischen Philosophie, Erstes Buch: Allgemeine Einführung in die reine Phänomenologie*. The Hague: Martinus Nijhoff; *Ideas Pertaining to a Pure Phenomenology and to a Phenomenological Philosophy, First Book*. F. Kersten (Trans.). The Hague: Martinus Nijhoff, 1983.
- Hua III/2. Husserl, E. (1976). *Ideen zu einer reinen Phänomenologie und phänomenologischen Philosophie, Erstes Buch: Allgemeine Einführung in die reine Phänomenologie. 2. Halbband, Ergänzende Texte (1912–1929)*. The Hague: Martinus Nijhoff.
- Hua IV. Husserl, E. (1952). *Ideen zu einer reinen Phänomenologie und phänomenologischen Philosophie, Zweites Buch: Phänomenologische Untersuchungen zur Konstitution*. The Hague: Martinus Nijhof; *Ideas Pertaining to a Pure Phenomenology and to a Phenomenological Philosophy, Second Book*. R. Rojewicz and A. Schuwer (Trans.). Dordrecht: Kluwer, 1989.
- Hua V. Husserl, E. (1952). *Ideen zu einer reinen Phänomenologie und phänomenologischen Philosophie, Drittes Buch: Die Phänomenologie und die Fundamente der Wissenschaften*. The Hague: Martinus Nijhof; *Phenomenology and the Foundations of the Sciences*. T. Klein and W. Pohl (Trans.). The Hague: Martinus Nijhoff, 1980.
- Hua VI. Husserl, E. (1954). *Die Krisis der europäischen Wissenschaften und die transzendente Phänomenologie: Eine Einleitung in die phänomenologische Philosophie*. The Hague: Martinus Nijhoff; *The Crisis of European Sciences*

- and *Transcendental Phenomenology*. D. Carr (Trans.). Evanston, IL: Northwestern University Press, 1970.
- Hua VII. Husserl, E. (1956). *Erste Philosophie (1923/24). Erster Teil: Kritische Ideengeschichte*. The Hague: Martinus Nijhoff.
- Hua IX. Husserl, E. (1968). *Phänomenologische Psychologie*. The Hague: Martinus Nijhoff.
- Hua XIV. Husserl, E. (1973). *Zur Phänomenologie der Intersubjektivität. Zweiter Teil: 1921–1928*. The Hague: Martinus Nijhoff.
- Hua XVII. Husserl, E. (1974). *Formale und transzendente Logik. Versuch einer Kritik der logischen Vernunft*. The Hague: Martinus Nijhoff; *Formal and Transcendental Logic*. D. Cairns (Trans.). The Hague: Martinus Nijhoff, 1969.
- Hua XXVII. Husserl, E. (1989). *Aufsätze und Vorträge (1922–1937)*. Dordrecht: Kluwer Academic Publishers.
- Hua XXXII. Husserl, E. (2001). *Nature und Geist*. Dordrecht: Kluwer Academic Publishers.
- Hua XXXIX. Husserl, E. (2008). *Die Lebenswelt*. Dordrecht: Springer.
- Hua Mat IX. Husserl, E. (2012). *Einleitung in die Philosophie*. Dordrecht: Springer.
- Husserl, E. (1973). *Experience and Judgment*. Evanston, IL: Northwestern University Press.
- Ingarden, R. (1972). What is new in Husserl's *Krisis*? *Analecta Husserliana*, 2, pp. 23–47.
- Kern, I. (1979). Die Lebenswelt als Grundlagenproblem der objektiven Wissenschaften und als universales Wahrheits- und Seinsproblem. In: E. Ströker, ed., *Lebenswelt und Wissenschaft in der Philosophie Edmund Husserls*. Frankfurt am Main: Vittorio Klostermann, pp. 68–78.
- Koyré, A. (1943). Galileo and Plato. *Journal of the History of Ideas*, 4(4), pp. 400–428.
- Luft, S. (2004). Husserl's theory of the phenomenological reduction: Between life-world and Cartesianism. *Research in Phenomenology*, 34, pp. 198–234.
- Luft, S. (2011). *Subjectivity and Lifeworld in Transcendental Phenomenology*. Evanston, IL: Northwestern University Press.
- Majolino, C. (2008a). Un livre sédimentaire. In: C. Majolino and F. De Gandt, eds., *Lectures de la Krisis de Husserl*. Paris: Vrin, pp. 7–22.
- Majolino, C. (2008b). Des signes et des phénomènes. Husserl, l'intrigue des deux psychologies et le sujet transcendantal. In: C. Majolino and F. De Gandt, eds., *Lectures de la Krisis de Husserl*. Paris: Vrin, pp. 161–195.
- Majolino, C. (2018). The infinite academy. *The New Yearbook for Phenomenology and Phenomenological Philosophy*, XV, pp. 164–221.
- Melle, U. (1996). Nature and spirit. In: T. Nenon and L. Embree, eds., *Issues in Husserl's Ideas II*. Dordrecht: Springer, pp. 14–35.
- Moran, D. (2012). *Husserl's Crisis of the European Sciences and Transcendental Phenomenology*. Cambridge: Cambridge University Press.
- Moran, D. (2015). Everydayness, historicity and the world of science: Husserl's life-world reconsidered. In: L. Učník, I. Chvatík and A. Williams, eds., *The Phenomenological Critique of Mathematization and the Question of Responsibility*. Dordrecht: Springer, pp. 107–131.

- Orth, E. W. (1999). *Edmund Husserls 'Krisis der europäischen Wissenschaften und die transzendente Phänomenologie': Vernunft und Kultur*. Darmstadt: Wissenschaftliche Buchgesellschaft.
- Paci, E. (1972). *The Function of the Sciences and the Meaning of Man*. Evanston, IL: Northwestern University Press.
- Patočka, J. (2015). Edmund Husserl's Die Krisis der europäischen Wissenschaften und die transzendente Phänomenologie. In: L. Učnik, I. Chvatik and A. Williams, eds., *The Phenomenological Critique of Mathematization and the Question of Responsibility*. Dordrecht: Springer, pp. 17–28.
- Seidengart, J. (2019). L'origine philosophique de la mathématisation de la nature et sa reconstruction chez Husserl et Cassirer. In: J. Farges and D. Pradelle, eds., *Husserl Phénoménologie et fondements des sciences*. Paris: Hermann, pp. 253–271.
- Sowa, R. (2010). Husserls Idee einer nicht-empirischen Wissenschaft von der Lebenswelt. *Husserl Studies*, 26, pp. 49–66.
- Staiti, A. (2014). *Husserl's Transcendental Phenomenology*. Cambridge: Cambridge University Press.
- Stein, E. (1937). Edmund Husserl. La crise de la science et de la philosophie transcendente. *Revue Thomiste*, 42–43, pp. 327–329.
- Steinbock, A. (1995). *Home and Beyond*. Evanston, IL: Northwestern University Press.
- Ströker, E. (1988). Edmund Husserls Phänomenologie: Philosophia Perennis in der Krise des europäischen Kultur. *Husserl Studies*, 5, pp. 197–217.
- Ströker, E. (1992). *Husserls Werk. Zur Ausgabe der Gesammelten Schriften*. Hamburg: Felix Meiner Verlag.
- Ströker, E. (1996). Krise der europäischen Kultur: Ein Problemerbe der Husserlschen Philosophie. *Zeitschrift für philosophische Forschung*, 50(1), pp. 309–322.
- Trizio, E. (2016). What is the crisis of Western sciences? *Husserl Studies*, 32(3), pp. 191–211.
- Trizio, E. (2018). The telos of consciousness and the telos of world history. *Humana Mente*, Special Issue, pp. 77–103.



# Conclusion

This book began with the claim that mathematical physics plays a double role within Husserl's project. On the one hand, it sets the theme for a specific chapter of Husserl's foundational enterprise; on the other, it is the object of philosophical misunderstandings, which, under various forms of naturalism and objectivism, pose a deadly threat to the task of establishing philosophy as a rigorous science. The intertwinement of these two themes throughout Husserl's intellectual career has become apparent, as have the interpretative difficulties arising from it. Yet, the intricacy of this double role has also proved to be a precious hermeneutical resource illuminating the internal articulation of phenomenological philosophy. Furthermore, it has appeared that, when seen in light of this problematic, the evolution of Husserl's thought displays a remarkable continuity and a coherent, gradual explication. To be sure, mathematical physics' unique role among all other empirical sciences has a *fundamentum in re* and does not rest on any contingent feature of our intellectual history. Thus, it is unsurprising that the philosophical conception of material nature plays such an important role for the general problem of the intelligibility of the world. Even more important, though, is the fact that the mathematical character of the fundamental science of material nature produces a dualism between intuitive and idealized nature replete with obscurities and which, more than anything else, has sealed the fate of the modern revival of the idea of philosophy as the universal science of being.

The world is a classical metaphysical theme that, as we have seen, Husserl took up at the very beginning of his career. Traditionally, both the existence of the world and its articulation in different fundamental domains have been the object of metaphysical investigation. The existence of the world, in turn, is not just a matter of affirming or denying it, but of correctly understanding what we mean by it. Husserl's early reflection on the incompleteness of the empirical sciences must be understood, first and foremost, in light of this metaphysical consideration of the world. At the beginning, Husserl's interest with respect to such sciences coincides with the analyses of their unquestioned presuppositions, which include also the disciplines that he will later include in the *mathesis*

*universalis* and whose clarification has a broader generality than any theoretical questions concerning the world. However, they also contribute to defining the sense of the world-problem that lies at the center of Husserl's theory of science. A simple way to realize this is to think of how logical psychologism determines a betrayal of the very sense of truth and thereby of any factual truth, including the existence of the world. We have seen that Husserl's early discussions of the empirical sciences' incompleteness stressed that the world in general as well as its different subdomains admit of different metaphysical interpretations (such as realism, idealism, phenomenism, and Kantianism) that cannot themselves be accepted or rejected on an empirical basis. What is in question in these positions is the interpretation of the being of the world. Husserl was also persuaded early on that these positions rest, in turn, on the way the fundamental questions of the theory of knowledge are answered. As a consequence, the theory of knowledge stands out as the fundamental discipline on which the possibility of a metaphysical restitution of the intelligibility of the world as cognized by empirical science is ultimately grounded. Such a theory of knowledge must in turn be free of any metaphysical presuppositions. Husserl will never abandon this theoretical framework. At this early stage, Husserl calls "metaphysical" both the positions that interpret the being of the world and of its different subdomains in relation to knowing subjectivity and the ultimate knowledge of factual reality that scientific knowledge, once elucidated, can provide. Scientists' naiveté is characterized in terms of their uncritical acceptance of the natural man's prescientific conception of the world. This naiveté is highlighted by the very existence of the aforementioned competing metaphysical positions, which are not explicitly denounced as themselves naïve. After the transcendental turn, this situation becomes the following: while the scientist uncritically operates in the natural attitude, all traditional metaphysical positions and their epistemological presuppositions are condemned for their inability to completely free themselves from the transcendent apperceptions characterizing the natural attitude. Contrariwise, transcendental phenomenology does not provide yet another "interpretation" of the being of the world; rather, it provides the intuitive elucidation of its sense. Phenomenology, as we have seen, is transcendental primarily because it elucidates the sense of being of transcendence. But this elucidation does not amount to a simple change of subject with respect to traditional metaphysics. There is no "metaphysical neutrality" in the sense that, beyond phenomenology, the traditional positions of modernity could be revived and reconsidered. In particular, no form of metaphysical realism or subjective idealism are compatible with transcendental idealism, for which reality itself is no less real for being ontologically relative to transcendental consciousness. Furthermore, the articulation of the world into essentially different domains, which was likewise a traditional metaphysical theme, is taken up by the various regional ontologies that provide transcendental

phenomenology with its constitutive themes. This eidetic-transcendental-ontological framework provides the basis for turning empirical sciences into a posteriori metaphysics of factual reality.

The elucidation of the world is the central concern of transcendental phenomenology. The world presents a complex internal articulation that can be spelled out in terms of overlapping essential oppositions: theoretical/practical-axiological, natural/cultural-historical, prescientific/scientific. Within nature and culture, one must further distinguish the domain of the different special sciences; within material nature, there lies the opposition between intuitive and mathematized nature. Finally, to worldly reality as such, one has to oppose the domain of the ideal. The key function of the theory of constitution is to clarify the way in which such different domains hold together to yield the one, unitary existing world. The reduction of the world to a pure phenomenon is what makes possible the investigation of this articulation. The world-phenomenon has, so to speak, its internal grammar, its syntactic structure prescribing a fixed constitutive hierarchy to its different layers, a hierarchy of their manifestation, of their being an object of cognition. Now, it is an inherent feature of the natural attitude to construe the world as something that stands on itself, the unity of which can be understood from within itself. As we have seen, the naturalistic attitude characterizing modern science, which is legitimate within certain limits, is a hyper-objectivist form of the natural attitude. The mathematization of material nature that stems from it has produced a corresponding hyper-objectivist interpretation of the being of the world. The world, after the manner of Galileo and Descartes, is *built on material nature* conceived as a mathematical being existing in itself. Thus, modernity has turned the objective order of foundation existing within the life-world, which, once transcendently elucidated, does not imply any countersense, into an absurd dualistic metaphysics that makes both the world and knowing subjectivity unintelligible. As a result, philosophy and, along with it, European culture, has entered a state of crisis.

According to Husserl, the roots of the modern misunderstandings concerning nature lie in the dualism between intuitive and idealized nature. The *mathematical form* of physical theory has misled modernity. The two main targets of Husserl's criticism, critical realism in *Ideas I* and the early modern metaphysics of the *res extensa* in the *Krisis*, are in this respect extremely similar. Indeed, the former is but a late consequence of the misconceptions deriving from the latter, mediated by Locke's naturalistic theory of knowledge and by a likewise naturalistic understanding of Kant's critical enterprise. The modern psychophysical "splitting of the world" underlie both positions. Both Descartes and the critical realists reduce intuitive nature to a "phenomenon" occurring in the closed space of the mind and causally produced by an objective "external world" existing in itself. Thus, the two constitutive layers of material nature, the intuitive and the idealized, are separated from one another. The

difference lies in the interpretation of the latter. Within Descartes' objectivist universal philosophy ("universal mathematics"), idealized nature becomes a substance the geometrical essence of which can be known a priori (the famous wax example) and the existence of which is the result of a demonstrative procedure (through God's existence and veracity). For critical realists (as for many other strains of realism), physical theory affords only partial and indirect access to a nature that in itself cannot be completely known, and that psychophysical experiments show to be different from the way it appears to us. Needless to say, critical realists work at a time in which the demise of the rationalistic ideal of philosophy has already weakened the epistemic optimism of modernity. However, from the phenomenological standpoint, the source of these misunderstandings is the same. We face theories of knowledge and resulting interpretations of the being of the world that stem from the failure to overcome the natural attitude. Knowledge is understood in terms of transcendencies (Descartes' *res cogitans* and *res extensa*, or the psychophysical subject and the unreachable nature in itself) and the likewise transcendent causal bond between them.

The reconstruction of the phenomenological critiques of these two standpoints has occupied a large part of this book because, through them, it is possible to cast light on two important layers of Husserl's own account of nature and of the world. We have seen that Husserl, after explaining in *Ideas I* that idealized nature is just a theoretical determination of intuitive nature, and that both are constituted in transcendental consciousness, indicated in *Ideas II* how to integrate into his transcendental account the psychophysical considerations on which Helmholtz and the critical realists relied. It has appeared that the pure nature-phenomenon contains the psychophysical causal and conditional structure that motivates the mathematization of nature. In this way, the mathematization of nature is understood by elucidating the original transcendence of psychophysical intuitive nature, and the metaphysical absurdity of a nature in itself unknowable is eliminated. The second layer emerges, instead, in the context of Husserl's critique of modernity in the *Krisis*. I have argued that if the results of the third part of *Ideas II* are taken into account, the *Krisis* reveals that the constitution of nature sketched in the first two sections of that work appears incomplete and one-sided. The naturalistic attitude and its correlate, psychophysical nature, appear as partial and derivative with respect to the concreteness of the life-world. They presuppose the historicity of a personal subjectivity motivated by the goal of theoretically determining the world. Only at this stage do we recognize that the life-world includes the world of scientific truth, and, in particular, the nature posited by the naturalistic attitude, as a partial and subordinate structure.

The life-world is Husserl's final way of characterizing the forgotten and pregiven horizon of the positive sciences. It is the world in its full

concreteness, articulated along the aforementioned essential oppositions. It is the world the unity and sense of being of which can be understood only by resorting to the depth dimension of the constitutive life. If Husserl decided to use the expression “life-world” rather than “world,” it is because modern objectivism has rendered the latter term completely obscure by building the notion of the world on the theoretical accomplishments of mathematical physics.



In different parts of this book, I have criticized attempts to attribute to Husserl the intention of devaluing the ontological validity of physical theory, and I have sharply opposed his views both to the radical empiricist positions *à la* Mach and to the forms of scientific antirealism currently discussed in the philosophy of science. As to the former, there is no doubt that Mach represented for Husserl a revival of Hume’s psychologistic dissolution of objectivity, which marks the final collapse of modern philosophy. As to the latter, scientific-antirealist readings of Husserl are radically incompatible with the very nature of phenomenological philosophy and, worse, they obfuscate the sense of the theory of constitution and of transcendental idealism itself, according to which any conceivable objectivity is cognizable in principle. Furthermore, they contradict Husserl’s explicit intent to convert empirical sciences into metaphysics. The gulf between transcendental phenomenology and contemporary philosophy of science motivates also a further, more general reflection in relation to my initial claim that no part of this book is about an alleged Husserlian “philosophy of science,” or about how phenomenology can contribute to philosophy of science.

Why should one resist speaking about Husserl’s philosophy of science? And why should one oppose the phenomenological account of science to philosophy of science *sic et simpliciter*, rather than to some of the views that are currently predominant in that field of studies? Admittedly, one could stipulate that whenever philosophers engage in the discussion of the epistemic status of the positive sciences they are doing “philosophy of science.” This is certainly a use that has been somewhat accepted – witness the frequent mention in academic publications of Descartes’, Kant’s, or Hegel’s “philosophy of science” (or even Plato’s and Aristotle’s). Strong motives, however, speak against this broad use of the expression. In addition to the awkwardness of annexing to philosophy of science thematic areas that belong to the most fundamental theoretical core of such philosophies (the case of Kant being paradigmatic), these formulations mask the specific situation of contemporary philosophy of science with respect to the philosophical tradition. It is not by chance that this appellation is so recent. As has already been mentioned, as an academically established, fairly autonomous and specialized discipline, the philosophy of science

arose in the English-speaking world after World War II. The complex circumstances and the different phases that led to its emergence, in which a crucial role is played by the legacy of logical empiricism, are way too complex to be mentioned in passing. The defining feature of the endpoint of this process is, in contrast, quite clear: today's philosophers of science do not see or practice their discipline as an integral part of general philosophy, no matter how much they are aware that philosophy stretches well beyond their own area of concern. The issues they discuss derive from a confrontation with the existing sciences and their history conducted *in light of* a range of traditional epistemological problems and positions that require a rather minimal engagement with the broadest philosophical issues. The debate on scientific realism is paradigmatic in this respect, with its prototypical opposition between realism and empiricism, subsequently supplemented by a family of constructivisms of more or less relativistic flavor. On the one hand, this specialized literature has produced a wealth of methodological and historical studies, as well as sophisticated foundational and interpretative analyses of specific scientific theories the significance and value of which I do not intend to downplay. On the other hand, however, it has relied on philosophical resources of remarkable poverty. This is astonishing when one considers that a complete clarification of the nature of scientific knowledge requires taking positions one way or another on some of the most general and fundamental philosophical themes, such as subjectivity, objectivity, intersubjectivity, rationality, truth, world, being, historicity, and language. The philosophy of science is caught in this paradoxical situation, and, I would add, is defined by it.

In keeping with the central theme of this book, this situation can be best highlighted in relation to the very notion of "world." Within the philosophy of science, and science studies in general, one finds different implicit or explicit attitudes towards this notion. What is common to them is the unexpressed and unquestioned conviction that the sense of the world can be decided on the basis of an analysis of the objectifying procedures of science, whether this analysis concerns their logical and methodological structure or their material-experimental basis or their historical and social dynamics. Two broad camps can be discerned. Scientific realists of all stripes, no matter what components of scientific knowledge they deem to mirror the inner structure of the world (laws, entities, structures, models etc.) and no matter their degree of ontological reductionism and pluralism, "*build*" *the world* on the correlate of natural-scientific theoretical and experimental activities. To be sure, while hard-line physicalists build the world on the idealized (in Husserl's sense) nature of modern physics, other (less optimistic) realists, no different from their critical realist predecessors, admit of a hidden side of nature, beyond the grasp of our theories. However, the more cautious positions of the latter are defined by way of a retreat from the optimism of the

former. What is common to all is a dogmatic metaphysical realism for which the world has the sense of *an in-itself that natural science strives to reach*. In the other camp, we find the various forms of relativisms and constructivisms that challenge the idea of an objective knowledge of the world. But, once more, in what way does the world become a theme for them? It suffices to mention one of their most influential predecessors: Thomas Kuhn and his famed “world-change” thesis. An analysis of the doubtlessly problematic and non-cumulative character of theory change through “scientific revolutions” is taken by Kuhn to justify a thesis concerning the very being of the world, once more revealing that the world is understood as what lies *downstream of scientific knowledge* rather than as something that must be elucidated before investigating the internal historical and social dynamics of scientific knowledge. This frame of mind has been inherited by those who today reject metaphysical realism on the basis of this or that feature of scientific and experimental practices. But what kind of truly philosophical approach to the world could be developed within a discipline such as the philosophy of science (and, a fortiori, the so-called science studies), which has severed its connection with general philosophy? In what genuinely philosophical way could the world become a theme before and independently of its scientific objectivation?

To be sure, from the standpoint of Husserl’s philosophy, the philosophy of science cannot access any original philosophical problematics because it remains within the natural attitude. This is true of both the aforementioned camps. Both the reality existing in itself of the realists and the social world of the constructivists are transcendencies, the sense of being of which remains undefined. When knowledge is understood based on them, nonsense is inevitable. In this way, we can appreciate the fact that contemporary philosophy of science remains caught between the opposing errors that Husserl had denounced under the general headings of naturalism and historicism. Yet, one should not forget that the lack of philosophical grounding of philosophy of science is a phenomenon that can be understood also without presupposing Husserl’s entire conceptual framework.

How unhealthy this situation is given the historical mission of philosophy itself should, I believe, be only too clear. At the very least, it should be clear that the separation between philosophy and science and the resulting establishment of a compartment of philosophy that investigates the positive sciences is incompatible with Husserl’s project to unify all theoretical activity under the heading of genuine science. Indeed, it would be hard to maintain that the philosophy of science strives to turn the positive sciences into branches of a methodologically self-aware and self-grounding universal philosophy. Thus, these brief considerations suffice to justify my choice to oppose phenomenology to the philosophy of science *tout court*. What is at stake in this contrast is a completely different attitude towards philosophy’s nature.

While I do not claim that a similar critique cannot draw on the work of other systematic thinkers, it is unquestionable that Husserl's thought offers valuable conceptual resources to question the geography of today's philosophical and scientific world, also in relation to other specialized areas. The current fragmented state of philosophy, the existence of an archipelago of distinct philosophical disciplines, is, in light of Husserl's thought, a result of the crisis of philosophy. His attempt consisted in bringing to light the submerged continent, of which these islands are but interconnected parts. A powerful critical motive arises from his philosophy, for whoever is unwilling to inhabit a shuttered world.



# Index

- Aestheta* 155–157, 159, 160,  
163–164, 175, 180, 181, 195, 231  
animal 15, 18, 19, 30n36, 72, 75, 78,  
99, 100, 117, 152, 164, 178, 180,  
182, 200n93, 249–250  
Aristotle 11, 43, 45, 46, 49, 52, 59,  
66–67, 92n114, 155, 174, 219,  
257, 304  
atomism 16, 22, 30n40, 91n93;  
atomistic worldview 16  
attitude 70–72, 80–81, 93n126,  
99, 199n69, 258–263, 292n162,  
306; natural 45, 61, 63, 71–73,  
76–81, 92n127, 92n130, 97,  
98–100, 108, 138, 141–143,  
151, 172, 177–180, 195,  
199n85, 204, 210, 212, 215, 223,  
258–264, 266, 269, 273–274,  
283, 286, 292n171, 293n188,  
293n191, 295n224, 295n227,  
301–304, 306; personalistic  
71, 92n127, 209–210, 215,  
257–264, 275, 286; practical  
173, 211; theoretical 68–69, 152,  
172, 210–211, 219, 226, 230,  
269, 276, 292n162, 295n220;  
transcendental 68–70, 138, 152,  
215, 257–264, 272–274; *see also*  
eidetic
- being 43–44, 50–52, 54–56, 58–61,  
63–64, 66–68, 73–76, 80–86,  
91n94, 93n148, 94n166, 98–104,  
107–114, 116–117, 136–143,  
170, 185, 188, 198n62, 205, 211,  
213, 219–220, 246–247, 257,  
261, 263, 265, 269–286, 296n235,  
301–306; of nature 26, 45, 76,  
84, 183, 214, 235; of reality 44,  
45–46, 51, 73, 83–84; science of  
59, 63, 91n94, 196, 206–207, 256,  
300; of the world 45–46, 85–86,  
99–100, 142–143, 184, 206,  
244, 265, 284, 301–306; *see also*  
animal; human
- Berkeley, George 19, 44–45, 103,  
115, 141, 143n15, 144n20  
body 18–20, 26, 29n29, 32n55,  
47, 67, 75, 100–102, 117–118,  
120, 143n3, 161–163, 166, 176,  
208, 212, 229, 232, 249, 273,  
278, 281–283; mind-body 15,  
293n184
- Brentano, Franz 32n62, 52, 127
- Cassirer, Ernst 11, 25, 27n1, 28n4,  
29n20, 189, 292n140  
causation 15, 19, 20, 32n57, 43, 49,  
52, 58, 67, 69, 77–78, 110–118,  
127–128, 131, 134–136,  
153–170, 176–182, 190, 194,  
200n93, 210–213, 216, 218,  
229–235, 244, 249, 261, 276,  
281, 289n20, 289n21, 291n110,  
293n183, 303
- consciousness 43–44, 48, 57, 62,  
68–84, 93n148, 94n166, 97–142,  
151, 169–171, 176, 179, 183,  
184, 185, 189, 196n17, 198n63,  
212–214, 223, 225–227, 263,  
269–273, 279, 281, 283, 289n21,  
296n235, 301, 303
- Descartes, René 15, 23, 54, 62, 75,  
76, 101–102, 104, 115, 141, 171,  
184, 187, 195, 198n60, 198n62,  
205, 228, 280–284, 296n249,  
302–304
- doxa* 98, 140, 217, 228, 269, 271,  
273, 276
- Du Bois-Reymond, Emil 13–18, 24,  
26, 28n6, 28n9, 28n20, 29n21,

- 29n26, 48 184, 186–188, 196,  
200n98, 290n97
- Duhem, Pierre 11–12, 28n2,  
30–31n41, 49, 63, 91n93, 132,  
198n54, 257
- eidetic 60, 64, 67, 69–74, 79–83,  
87, 92n112, 92n123, 97–100,  
105–108, 110–122, 126–130,  
138–140, 143n17, 146n57,  
152–153, 159–160, 166, 178–183,  
188, 192–195, 198n62, 199n69,  
200n91, 214, 222–223, 234, 253,  
256, 257, 259, 261, 263, 266,  
273–278, 302; attitude 72; law 69;  
phenomenology 82, 139; reduction  
133, 152, 178, 180
- Einstein, Albert 53, 193–194,  
201n115, 262
- electromagnetism 15, 16, 33n62, 118,  
165, 197n39
- energy 16, 20, 26, 50, 113, 114, 118,  
120, 164–165, 192
- episteme* 140, 173, 217, 218,  
228–231, 245, 248, 250, 256, 269,  
273, 276–277
- Erlebnis* 75, 77–78, 81, 100, 102,  
107, 109, 116, 143n17, 151, 157,  
170, 181, 261
- Euclid 38–40, 52–54, 63, 66,  
104–105, 120, 136, 186, 192–193,  
201n115, 219, 237
- Fraassen, Bas van 128–131, 146n70,  
147n85
- Galileo 20, 33n67, 62, 102, 133,  
134, 135 144n35, 147n99, 174,  
183, 192, 193, 198n63, 200n93,  
204–286, 291n109, 291n120,  
296n240, 302
- Geist* *see* spirit
- God 36–37, 87, 88n4, 115, 122–124,  
130, 166, 170, 204, 205, 281, 284,  
287n5, 296n249, 303
- Hardy, Lee 131–137, 147n89,  
147n97, 148n100, 198n59
- Harvey, Charles 125–129, 133, 137,  
146n66, 146n70
- Hegel, Georg Wilhelm Friedrich 42,  
88n26, 304
- Heidegger, Martin 144n34, 174,  
199n72
- Helmholtz, Hermann von 21–27,  
31n44, 32n45, 32n54, 32n61,  
32n62, 48, 88n6, 89n27, 109, 168,  
177–182, 194–195, 199n88, 224,  
269, 274, 303
- human 13, 15, 17, 19, 25, 71, 72,  
75–76, 78, 81, 99, 100, 101–102,  
112, 117–122, 124, 129, 140,  
143n17, 144n19, 166–167,  
180–181, 204, 208–214, 221,  
249–250, 253–254, 259–268,  
270, 275–278, 280–282, 293n188,  
293n189, 295n224
- Hume, David 19, 76, 89n26, 184,  
205, 278, 304
- idealism 19, 24, 42, 44, 45, 48, 52,  
57, 61, 62, 83–86, 94n168, 107,  
129, 137, 142, 148n112, 170, 175,  
257, 280, 283, 287, 301–303, 305;  
German 42, 88n26, 205, 278
- idealization 39, 92n109, 104, 106,  
113, 120–124, 127, 131–141,  
147n99, 147n100, 159–161, 165,  
167–168, 175, 187–188, 191–194,  
208, 213, 218, 222–233, 242–244,  
256, 262–264, 266, 271–273,  
276, 281, 286, 292n141, 293n183,  
295n231, 300, 302–303, 305
- Ignorabimus* 15–17, 27, 29n20,  
29n21, 48, 86, 184
- Ingarden, Roman 174–183, 194,  
199n80, 199n85, 274, 287n1
- instrumentalism 25, 126, 128,  
148n112, 168
- intentionality 1, 30n31, 68, 99, 102,  
107, 184, 293n189
- Kant, Immanuel 20, 21, 27, 28n4,  
31n44, 32n45, 32n55, 39–40, 42,  
45, 57, 61–62, 66–67, 76, 82, 83,  
84, 89n27, 92n112, 92n113, 101,  
133–135, 147n97, 148n112, 184,  
186, 198n60, 205, 221, 229, 261,  
277–278, 291n112, 301, 302,  
304; neo-Kantianism 21, 27, 28n4,  
31n44, 89n27
- knowledge: empirical 32n45,  
53, 62–63, 73–74, 151, 224;  
metaphysical 81; physical 13–25,  
28n20, 29n21, 35n62, 106;  
scientific 11, 18–19, 28n5, 36–37,  
42, 45–46, 49–50, 60, 77–78, 126,  
134, 152, 159, 174, 186, 189, 196,  
217–218, 242, 272, 286, 288n6,

- 301, 305–306; transcendent 74–76, 93n148; ultimate 36, 50–51, 57, 81–83, 85, 196, 286–287, 301
- Külpe, Oswald 21, 31n42, 32n47, 32n61, 143n15, 168
- Laplace, Pierre-Simon 12–13, 15, 28n2, 136, 190
- law: eidetic 70; natural 24, 32n57, 55, 69, 209, 293n183; physical 21, 31n41, 49–50, 54–55, 89n54, 133, 136, 165, 169
- Leib* 30n31, 151, 154–164, 167, 175–177, 179–181, 185, 188, 194–196, 196n16
- Leibniz, Gottfried Wilhelm 14–15, 54, 205, 237, 281, 288n7
- Locke, John 20–23, 27, 76–77, 102–103, 115, 132, 144n19, 144n20, 147n83, 198n60, 302
- Lotze, Hermann 39, 31n42
- Mach, Ernst 12, 17–27, 29n25, 29n26, 30n36, 30n40, 30n41, 32n45, 32n57, 46, 47–49, 62, 87, 90n79, 91n93, 132, 168, 169, 171, 184–185, 196, 246, 304
- mathematics 16, 20, 26, 51, 54, 70, 120, 147n89, 189, 194, 218–219, 222–223, 227, 229–233, 238–239, 247, 251, 281, 290n62, 303; mathematical physics 1, 3, 5, 26, 49, 106, 121–124, 127, 133, 138, 139, 158, 183, 185, 194–195, 205, 221–223, 234, 236, 241–242, 245, 250–257, 259, 270–272, 276, 278, 286, 300, 304; mathematicalscience 1, 3, 11–12, 46, 72, 97, 173, 215–218, 235, 237, 247, 251, 261, 273, 275–276; mathematization 1, 3–4, 6, 70, 144n35, 161–163, 172–174, 180, 183, 191, 194–195, 197n40, 212, 215, 221–222, 223, 231–232, 242–254, 255, 258, 276, 292n140, 302–303; *mathesis universalis* 53, 60, 73, 80, 140, 237–240, 292n129
- matter 6, 13–15, 18, 26, 28n2, 28n20, 31n41, 50, 120, 127, 165, 170, 183–184, 187, 193, 197n45; nature 30n31, 64, 69–70, 92n109, 97, 100–101, 117, 121, 129, 137, 140, 142, 160, 163, 165, 167, 170, 173, 183, 184, 187, 188, 190, 191, 193, 208, 216, 221, 222, 228, 249, 258, 261–263, 266, 273, 276, 279–284, 302, 303
- mechanism 29n20, 29n24; mechanistic worldview 11, 17, 24, 26, 184
- Merleau-Ponty, Maurice 174, 199n77, 199n85
- multiplicity 50, 53–54, 62–63, 73, 76, 104, 220, 225, 237, 270
- naturalism 5, 30n36, 67, 76, 205, 209, 212–213, 261, 293n181, 300, 306
- Newton, Isaac 12, 26, 28n2, 33n67, 40, 234
- objectivity 2–3, 27, 33n62, 41, 45, 51, 55, 61, 68, 69, 74, 82, 106, 139, 159, 162–163, 174–175, 182, 189, 196, 197n42, 215, 217, 225, 242, 246, 257, 264, 291n171, 304–305 objectivation 99, 157, 164, 180, 186, 200n91, 213, 217, 225, 227, 230, 232, 250, 258, 272, 306; *see also* knowledge
- ontology: formal 7, 38, 63–71, 74, 92n116, 223; regional 7, 63–69 80, 83, 92n123, 255, 301
- Ostwald, Wilhelm 12, 16, 29n24, 31n41, 62, 200n98
- perception: thing of 97–149, 152–153, 163, 167–170, 172, 176–177, 179, 182–184, 185, 193, 199n80, 261, 272
- phenomenalism 12, 17, 22, 24, 26, 30n36, 31n41, 32n57, 57, 87, 185, 198, 301
- philosophy: analytic 4, 12, 66, 68, 175; continental 4, 175, 199n72; of science 2–6, 31n41, 124, 128–131, 135, 137–138, 147n99, 174, 215, 254–255 285 304–306
- physical theory 11–33, 49, 106, 112, 114–117, 121, 124, 126, 129, 135–137, 142, 147n89, 151, 159, 164, 167–170, 176, 184–188, 197n39, 206, 255–257, 273, 302–304

- physics: thing of 100–135, 152, 154, 159–196, 199n80, 235, 261
- Planck, Max 12, 21, 24–25, 127
- Plato 73, 221, 244, 292n140, 292n141, 304
- Plena* 216, 228–235, 238, 244, 247, 276, 291n110
- positivism 17, 24–25, 31n41, 39, 44, 48, 62, 132, 147n89, 175, 204–205, 288n5
- psychology 18, 29n29, 29n30, 29n31, 31n42, 37, 51, 78, 97–98, 143n3, 178–182, 199n87, 199n95, 204, 207, 213, 250, 262, 264, 278–280, 283, 293n183, 293n184
- quantum mechanics 11, 17, 25, 130, 144n23, 189–192
- Rang, Bernhard 21–22, 30n41, 32n57, 168–172, 198n54, 198n59
- realism: anti- 48, 111, 126, 128, 137–138, 141, 148n100, 304; critical 24, 27, 32n47, 35n62, 38, 100, 101, 107–110, 115, 118, 127, 142–143, 144n34, 170, 172, 174, 176, 186, 194, 198n60, 213, 303; naïve 32n47, 101–102; scientific 4, 23, 101, 124–140, 143n15, 146n59, 148n112, 168, 259, 305
- relativity 11, 25, 49, 106, 123, 1320, 138, 144n23, 154, 157, 158–159, 163–164, 176, 180, 189–196, 218, 277, 286, 290n72
- sensation 13, 15, 18, 19–23, 30n36, 32n54, 45, 57, 118, 155, 170, 176–177, 180–185, 197n17, 197n18; sensuous determination 104, 106, 118, 122 sensuous experience 100, 106, 229
- skepticism 9, 33n62, 41, 50, 74, 157 196, 206, 257
- solipsism 24, 44, 45; solipsistic subject 152, 154, 157
- Spinoza, Baruch 83, 84, 94n165, 171, 205, 281, 288n7
- spirit: absolute 214–215, 275–277; objective 215, 263, 276; world of 9, 207–215, 279, 295n224
- Stumpf, Carl 6, 21, 32n57, 88n4
- subjectivity 1, 3, 5, 74, 80, 82, 85–86, 93n134, 94n166, 94n168, 109, 124, 139, 141, 154, 166–167, 172, 173, 183–184, 186, 214, 216, 248, 258–259, 262–264, 277–278, 280–282, 296n235, 302–303, 305; intersubjectivity 107, 139, 152, 164, 167, 195, 212–214, 216, 248, 258, 262, 274, 278, 286, 296n224, 305
- teleology 2, 172, 173, 208, 212, 214, 255, 267, 268, 270, 284, 285–287, 288n5, 295n220, 295n231
- theoria* 210, 222, 251
- thermodynamics 15, 16, 29n25, 62, 91n93
- Umwelt* 130, 209, 213, 256, 258
- world: life- 84, 133, 194, 203–296, 303, 304; of the senses 22, 25, 221; *see also* spirit



Taylor & Francis Group  
an informa business

# Taylor & Francis eBooks

[www.taylorfrancis.com](http://www.taylorfrancis.com)

A single destination for eBooks from Taylor & Francis with increased functionality and an improved user experience to meet the needs of our customers.

90,000+ eBooks of award-winning academic content in Humanities, Social Science, Science, Technology, Engineering, and Medical written by a global network of editors and authors.

## TAYLOR & FRANCIS EBOOKS OFFERS:

A streamlined experience for our library customers

A single point of discovery for all of our eBook content

Improved search and discovery of content at both book and chapter level

REQUEST A FREE TRIAL

[support@taylorfrancis.com](mailto:support@taylorfrancis.com)

 **Routledge**  
Taylor & Francis Group

 **CRC Press**  
Taylor & Francis Group