

15 Can the life-world be an illusion?

Answer to Harald Wiltsche

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1 Introduction

The relation between the life-world and the so-called “true world” of science is undoubtedly one of the thorniest and most intriguing issues discussed within the phenomenological tradition. It has also played a fundamental role in shaping its reception within other areas of contemporary philosophy, especially in the analytic tradition. Wiltsche’s commentary has the rare merit of foregrounding it with an admirable depth and clarity, and of broaching a discussion, which has far-reaching programmatic implications. Let me first say that I join forces with him in declaring that, to my knowledge, no complete and fully satisfactory account of such relation has ever been developed either by Husserl or by any later thinker who has carried on his legacy. In my book *Philosophy’s Nature*, I stressed the puzzlingly unmet challenge that the even *Special Relativity* poses to Husserl’s notion of an a priori ontology of nature.¹ Yet, I merely suggested a few ideas about the changes that transcendental phenomenology should undergo in order to accommodate the non a priori character of the structure of space-time of contemporary physics. It was not my aim there, nor is it the aim of my current research, to propose phenomenological interpretations of contemporary physical theories; but I sympathize with the current attempts of doing so, which, by the way, owe so much to the efforts of Wiltsche himself.

While I see many unsettling puzzles as soon as I reflect on these issues, and while I *do not* see unfolding before my eyes the system of genuine sciences (“*echte Wissenschaften*”) that, according to Husserl, would mark the end of their crisis, I *do* believe that the philosophical core of his views about the relation between science and the life-world remains valid. Only a radical, *philosophical* criticism directly aimed at them would persuade me of the opposite. This is why, in this answer, I will first go back to what appears to me so compelling about Husserl’s view of the relation between science and the life-world. This will serve as a premise for the (surely partial) answer that I will give to what Wiltsche evocatively calls “the coordination problem”.

2 The sameness thesis

What is (*a*) science? Taken in its full generality, this question lies at the heart of Husserl’s whole philosophy. It leads us to the scientific analysis of the formal structure of scientific

¹ Emiliano Trizio, *Philosophy’s Nature: Husserl’s Phenomenology, Natural Science, and Metaphysics* (New York and London: Routledge, 2020), 192–94.

discourse itself, of the *logos* of science. In this way, *logic* enters stage as the science whose task is to clarify the *form* of any conceivable scientific discourse, whether positive in character or ultimately philosophical (no vicious circle implied). However, there are several different sciences, or, alternatively, philosophy as *the universal science* must necessarily comprise multiple sub-disciplines. In order to explain why a science is different from another, a formal, purely logical consideration will not suffice; we must say what that science is about, that is, we must specify its *object*. This demand is so universal and inescapable that it applies to logic itself. Husserl's *Logical Investigations* are, already, the perfect case in point, based as they are on the conviction that no clarification of that nature of logic (conceived as theory of science) is possible without an account of what logical thinking is about. Transcendental phenomenology itself arises later as the science able "to see" how the thematic domains of all other sciences are disclosed. The sciences in the plural, including logic, "do not have the eyes" to witness the disclosure of their own domain of investigation, i.e., of the *things themselves* they are about. The transcendental and the eidetic reductions are methodic devices designed to identify and enact the correct kind of *seeing* necessary for this scientific task, which falls to phenomenology *qua* transcendental theory of knowledge.

When we apply such demand to natural science, it leads us into the purview of the phenomenology of natural-scientific consciousness and of the "phenomenology of nature itself as the correlate of natural-scientific consciousness".² A large part of my book specifies the content and method of what we can call, for short, phenomenology of nature, and does so with special reference to *the fundamental science of material nature*, i.e., physics. A key component of Husserl's phenomenology of material nature, i.e., of the theory of transcendental constitution of material nature, is the claim that the theoretical hypothesis put forward by physicists are about the very same things that we perceive and operate with, and no other. Thus, the object-domain of physics does not lie "beyond the world of perception"; it is the very correlate of our sensuous perceptual activity, once regarded with the aseptic attitude of the natural scientist. Let us call this *the sameness thesis*. To be sure, this thesis is only apparently trivial and can raise perplexities. In his review of *Philosophy's Nature*, Steven French has voiced some of these perplexities with great clarity:

Husserl's insistence that the perceived physical thing is "always and necessarily" the thing which the physicist explores [. . .] also seems problematic in the face of quantum theory. In its standard formulation this is not only couched in terms of highly abstract Hilbert space but also, apparently, renders fundamental particles as non-individuals, in some sense.³

Again, however, this might seem plausible when it comes to classical physics, so that an atom can be thought of as just a smaller version of the lump of matter perceived by the experimenter but it is surely less so when we consider how atoms, or particles more generally, are conceived of within quantum mechanics, or its

2 Edmund Husserl, *Ideen zu einer reinen Phänomenologie und phänomenologischen Philosophie, Erstes Buch: Allgemeine Einführung in die reine Phänomenologie*, ed. Karl Schumann, Husserliana III/1, (The Hague: Martinus Nijhoff, 1976); English translation: *Ideas Pertaining to a Pure Phenomenology and to a Phenomenological Philosophy, First Book*, trans F. Kersten (The Hague: Martinus Nijhoff, 1983), henceforth cited as *Hua* III/1 with German and English page references respectively, here 159/172.

3 Steven French, "Review of Emiliano Trizio's *Philosophy's Nature: Husserl's Phenomenology, Natural Science, and Metaphysics*," *Husserl Studies* 39 (2023), 345–50, here 346.

successor, quantum field theory. Here, in order to justify the insistence that there is “no reaching out beyond the world that is for consciousness” [. . .], a great deal of heavy lifting must be done by the idea that the thing that appears is a sign for the thing of physics, that is, for itself.⁴

Let us stress this point in passing: rejecting Husserl’s sameness thesis implies rejecting Husserl’s way of identifying the object of physics. This, in turn, sets the demand for an alternative account of such object. This challenge must be met by whoever is willing to answer the question “what is physics?” in a non-Husserlian way.

Now, framing Wiltsche’s coordination problem correctly requires, in my view, overcoming these perplexities about Husserl’s way of identifying the object of physics, without which any talk about the foundation of science in the life-world loses its meaning. To avoid the misunderstandings likely to arise because of the thematic focus of *Ideas I* (which was the grounding of transcendental phenomenology itself, not the foundation of the different sciences), I suggest to reformulate the sameness thesis in terms of “natures”, rather than “things”. What is the object of physics? Material nature as the correlate of sensuous perception.⁵ The sameness thesis now reads: “Scientific nature conceived in terms of physico-mathematical idealizations (such as exact space and time coordinates, particles, fields, forces) is the *same nature* that we perceive, but theoretically cognized”.⁶ I find this claim so compelling that I do not see why contemporary physics should even begin being a challenge for it.

Let us repeat once more our guiding question: what is physics about? Physicists deploy a vast array of concepts such as space-time structure, energy, particles, and fields. To the understanding of *what* do such concepts purport to contribute? Surely, the world we live in contains a great deal of things, processes, properties and relations other than the natural/causal ones. It includes psychological and social phenomena, artifacts, aesthetic, moral, and religious values. Furthermore, we can broaden our gaze in the direction of the ideal worlds of linguistic meanings, narratives, numbers, geometrical shapes, abstract algebras, and the like. Now, it should be readily admitted that nobody contrived concepts such as position, velocity, acceleration, mass, or, for that matter, neutrino and gravitational wave, in order to describe and explain people’s decisions, or animal behavior. Even less, in order to understand the cause of social inequalities, what makes some objects esthetically appealing and other repulsive or, say, why art is valued and exploitation condemned. Indeed, physics speaks about how heavy objects fall, why water expands when

4 French, “Review of *Philosophy’s Nature*,” 347.

5 The constitution of which is not an easy task, and goes far beyond the constitution of simple things such as the small cubic and spherical objects Husserl mentions *ad nauseam*. For instance, it must take into account distant objects that can only be seen, but never touched, such as the sun and the stars. It must describe the peculiar modes of constitution of milieus, such as the sea and the atmosphere. Furthermore, it must deal with the limitations that our body sets to our perceptual capacities (we cannot touch lava, taste melted iron, nor feel the pressure of an oceanic abyss on our body). Problems concerning psychophysical conditionality and perceptual normality/abnormality belong here, and so do the related issues of animal perception and sense-enhancing tools. Finally, a theme of its own is the specific type of *infinite totality* characterizing intuitive nature, which provides the sense-fundament of scientific cosmology.

6 Let us also stress that the term “idealization” does not mean the same in phenomenology and in philosophy of science. Husserl’s idealizations need not be “simplified models” (Trizio, *Philosophy’s Nature*, 135–37). The true physical world in itself that lies at the “endpoint” of the history of physics *consists entirely* of idealizations in Husserl’s sense.

it freezes, why glass is transparent while bricks aren't, why metal glows when heated, how ~~does~~ the sun ~~produce~~ light and heat, what the small lights dotting the sky at night really are. . . This leads to further questions: what is light? What is electricity? What is magnetism? Electromagnetism and spectroscopy enter stage, and so do the first atomic models based upon them. The emission spectrum of hydrogen atoms (read "some gas in a glass tube") shows that electrons' energy levels are quantized. Spectroscopy is applied to the observation of astronomical phenomena (read "to the electromagnetic radiation emitted by those objects we see in the sky and the likes of them that we see or detect by means of various instruments"), and a curious phenomenon called "red-shift" shakes our view of the large-scale spatiotemporal structure of the universe. *And so forth*. Science is built in successive stages. Each new description of reality leads to new problems, which cannot even be formulated without lower-level theoretical language, whence the impression that scientific research inhabits from the outset a world that is already objective and beyond the reach of our experience. This is an illusion, though. Physicists are not parachuted from some otherworldly region straight onto a universe woven using curved space-time and quantum fields as threads. Ultimately, the object-domain of physics must open up for us as a *layer* within the encompassing unity of the life-world: *material nature as disclosed in perception*.⁷

What has made us blind to this obvious fact? The modern epistemological conceptions according to which physical knowledge tries to pierce through the veil of Maya of our mental representations and reach for a domain of intrinsically unknowable realities lying beyond it. Perception, however, is no veil of Maya, and doing physics does mean to leap beyond the perceptual representations immanent to our mental life into an allegedly as well as puzzlingly "external" world. The world is only given to us as the all-encompassing intersubjective horizon of all possible perceptions. Our experimental settings and particle detectors exist in this world, and it is about it that they inform us. To be sure, Husserl's claim that, say, physics speaks about the very table I am perceiving remains unclear until one does not explain the exact meaning of "perception of a thing" and "perceived thing". Yet, this only highlights that the roots of a correct understanding of science lies in the study of how the objects of our experience gain their multi-layered sense of transcendence with respect to subjective and intersubjective experience.⁸

This does not mean that the entities postulated by physicists should "look like" the things of perception in any obvious sense. Let subatomic particles lose their identity, let them have no exact spatial location; let them become excitations of quantum fields or vibrating strings. It remains true that those particles and fields must ultimately help us give an account of the table I am writing on, of the sun that is shining on it, and of whatever exists between and through them. Not even a million years of theoretical physics could ever prove that the things we perceive are *nothing*.

7 Unsurprisingly, those who attempt to "eliminate" everything that does not belong to the ontology of mathematical physics, or to reduce what they see as only apparently non-physical to that same ontology have a hard time trying to specify what "physical" means.

8 This also entails that any philosopher of science willing to dismiss Husserl's claim that science is grounded on the life-world and, ultimately, on transcendental consciousness would have to go at the roots of the problem and develop an alternative account of intentionality, perception, and worldhood. I am afraid that such an investigation would not belong to the research area that one commonly calls "philosophy of science". On this "meta-philosophical" issue, see Emiliano Trizio, "Outline of a Phenomenological Metacritique of Philosophy of Science," *Studia Phaenomenologica* XXIV (2024), 7–29.

To be sure, physical explanations go beyond the consideration of one individual perceptual thing at the time. Physicists replace the entire stage of perpetual nature with a mathematical manifold, and explain not only the properties and causal behavior of things, but also their relations and the *milieu* in which they are embedded. For this reason, I believe Wiltsche is correct in framing the coordination problem as concerning the relation between “two natures” rather than “two things”.

3 Nature, life-world, and kenoworld

In order to address Wiltsche’s coordination problem, we need to take another step forward and say something more about the relation between nature and the life-world. What is the sense of the inclusion of the former into the latter? Husserl’s answer is that nature is *the abstract core of the life-world*⁹ because all entities that exist in the life-world are ultimately founded on nature, and more specifically on material nature. Indeed, material nature is a being that, at the outset, we experience because of its role in “supporting” the concreteness of the life-world. We experience it as the matter composing all objects of our surrounding environment, including living bodies (“*Leiber*”), as the materials out of which we build tools, houses, and other objects that, in a way or in another, *mean* something to us. In short, nature appears to us *as*, first of all, intermittently, as the various material components of the world *qua* correlate of pre-scientific life. This is *pre-scientific nature*. As soon as we take up the theoretical attitude, and, in particular, the *naturalist attitude* proper to the natural sciences, we switch to nature as an ontological domain of specific objects of knowledge. This ontological domain is acquired through a process of dismantling that Husserl calls “*Abbau*” (*Hua* XXXIX, 265), which consists in abstracting from subjectivity and from all components of the life-world requiring it. After this process of dismantling, a coin is just a piece of metal and holy tree is but. . . a tree. Crucially, all “*Leiber*” become “organisms”, i.e., a specific type of “*Blöße Dinge*” (mere things) object of the natural sciences only (*Hua* XXXIX, 272). Given that this nature is the correlate of the naturalistic attitude, it is better to adopt a terminology that signals its difference with respect to pre-scientific nature.¹⁰ We have now moved to nature conceived as a domain of possible objects of scientific knowledge. Yet, this is still intuitive nature. To an extent, mineralogy, botany, zoology, and medicine can dwell in it. Let us call it *perceivable or intuitive nature*. Physics takes a step further by idealizing it, i.e., by replacing such perceivable, material nature with what Husserl calls *substructions*, i.e., mathematical and exact space, time, movement, mass, force, and so forth.¹¹ This third nature is no longer intuitive and is bereft of all specifically sensible qualities.

Without altering Wiltsche’s choice of symbols, I propose, therefore, to take N_p to mean “perceivable (or intuitive) material nature”, rather than “pre-scientific” and N_s to mean “substructed (or idealized) material nature”, rather than “scientific”.¹² We can now

9 Edmund Husserl, *Die Lebenswelt, Auslegungen der Vorgegebenen Welt und ihrer Konstitution, Texte aus dem Nachlass (1916–1937)*, ed. Rochus Sowa, Husserliana XXXIX (Dordrecht: Springer, 2008), henceforth cited as *Hua* XXXIX, here 259–272.

10 As, unfortunately, I have failed to do myself at least twice in my book (Trizio, *Philosophy’s Nature*, 250, 261).

11 The psychic side of nature cannot be idealized because lived experiences cannot be replaced by substructions.

12 Husserl distinguishes between the *phenomenology of sensuous nature* (“*Sinnliche Natur*”) object of the descriptive natural sciences and the *phenomenology of objective nature* (“*objektive Natur*”) object of the

rephrase Husserl's sameness thesis as follows: " N_s is the theoretical determination of N_p by means of physico-mathematical idealizations". Husserl's readers know that this claim does not simply mean, "in order to arrive at N_s I need to take N_p as point of departure". For such a claim, any empiricist good sense would suffice. It means that N_s *cannot exist* without N_p . There is only one *material nature*, which first appears somewhat "discontinuously" through the material components of the objects populating the life-world of our pre-scientific life, subsequently, as the abstract, perceivable, and unitary scientific domain comprising purely material, value-free objects and processes, and, finally, as the correlate of the theoretical descriptions of mathematical physics. To ascribe to the latter the status of a self-standing ontological domain is the characteristically modern error that Husserl calls *physicalistic objectivism*.

In order to highlight this point, one needs only to go back to a mental experiment that Husserl suggested already in § 47 of *Ideas I*. There, Husserl famously described the extreme scenario called world annihilation, whose result is a worldless consciousness. As is well known, such annihilation does not consist in a form of metaphysical withdrawal of the world, a "*destructio ad nihilum*", which would be the opposite process of the divine "*creatio ab nihilo*". Rather, what Husserl has in mind is the complete loss of coherence among one's lived experiences: the chaos of "*Abschattungen*". Such lack of coherence would undermine all synthetic unities making up the transcendent world. This mental experiment and the notion of a worldless consciousness have been the object of severe criticism. However, for the purpose of this discussion, we need not follow Husserl down to this extreme conclusion. We can stop at the first stage of the world annihilation, which takes us before a perceptual world that is morphologically coherent, and, yet, does not exhibit a causal behavior regular enough to posit the exact nature of mathematical physics (*Hua III/1*, 100/105). It would still be a life-world that has material nature "at his heart", in which there are relatively stable things and processes, and living beings, in which a cultural life would be likewise possible. Some descriptive, morphological sciences could arise, too, but not the exact sciences. One would have to imagine, to put it very simply, that, while, in such a world, there are recognizable things, qualities, and processes, sound pitch does not show a precise correlation with the length of the cords producing them, nor would heavy objects systematically fall according to a fix law. More generally, magnetic, gravitational, optical, and thermal phenomena would not show an exact dependence of their causal antecedents. I do not see why we should dismiss this scenario as impossible in principle. Note that, we are not allowing an exact physical nature to hide behind the fuzzy life-world just evoked. Whoever is acquainted with Husserl's phenomenology of material nature and with his various criticism to the rival epistemological positions will recognize that there is no "ontological place" laying behind such nature. If this scenario is an eidetic possibility, as I believe it is, *all* forms of physicalistic objectivism are in serious trouble, for it highlights that the world cannot be built on an idealized, self-standing physical nature, and that the latter is a contingent declination of "wordhood" as disclosed in pre-scientific life.

exact natural science. To this distinction, there corresponds the distinction between the phenomenology of space and the phenomenology of geometrical formations (Edmund Husserl, *Aufsätze und Vorträge, (1911–1921)*, eds. Thomas Nenon and Hans Rainer Sepp, Husserliana XXV (Dordrecht: Martinus Nijhoff Publishers, 1987), 99.

It is by turning to a more general eidetic variation operated on the actual life-world that one can highlight to what extent, both in an epistemological and in an ontological sense, the life-world, so to speak, keeps the nature described by mathematical physics “on the leash”. All possible life-worlds must comprise a material nature as their *core*, but such core could obey to wildly different systems of physical laws. Quantum mechanics and Quantum Field Theory, too, would be true only in some of these possible life-worlds.¹³ Thus, we can vary the specific content of physical theories holding fast to the form of the correlation between subjectivity and the life-world as well as to the essence of the life-world. Within different life-worlds, the results of scientific experiments would be different. Progressing in the variation, experimental settings themselves would be different. This is, to be sure, the way to Husserl’s a priori ontology of the life-world, with its invariant structures and regional types. Finally, and this is the sense of the first stage of the world annihilation, we come to acknowledge that a life-world can be such that it does not admit any exact determination after the style of modern physics or, that it does so only up to a point.

Let us call a life-world that does not admit such exact physical determination *kenoworld*, that is “empty world”. The idea of emptiness is suggested by the fact that, in such a world, material objects would not harbor in themselves an objective description in mathematical and physical terms. It would be impossible to objectify them in absolute terms. Intuitive material nature, as the core of such life-world would still exist, but it would be a core hollowed out of its “in-itself”. Paraphrasing Husserl, the perceived thing would not be “a sign for a theoretical version of itself”, simply because such “theoretical double” would not exist. Surely, colors could still appear differently to different perceiving subjects, but there would be no objective chemical and physical property inhering in the objects themselves. Physical things and processes would show as many different “masks” as there are different “normal communities” of perceiving subjects, but they would have no true face. Similarly, the causal behavior of objects would not allow far-reaching predictions and retro-dictions. In phenomenological terms, this means that the progressive exploration of the various horizons of the given object would not allow the constitution of the “high-order transcendences” that form the “true” world of science.

The kenoworld has several interesting features that I cannot explore here. It is also questionable that such quasi-objective world would fully deserve to be called a “world”. Husserl used the world “*Scheinwelt*” (“illusory world”) for Plato’s world of particulars,¹⁴ and, to an extent (but only to an extent), also the kenoworld could be regarded as a “*Scheinwelt*”. However, and this is the point I want to make here, the kenoworld is a possible environment of intersubjective life, and, thus, a possible life-world, albeit a very impoverished one. It can also sustain linguistic communication and lower-level objective knowledge. This, in turn, implies that not only *how* the nature of physical science (N_s) happens to be (its being-so), but also *whether it exists at all* (its being) depends on the contingent features of the life-world we live in, and, more specifically, of its core N_p . This should make clearer what I mean by saying that the life-world keeps the nature described by mathematical physics “on the leash”.

13 Unless their principles are proved to be valid a priori.

14 Edmund Husserl, *Einleitung in die Philosophie, Vorlesungen 1916–1920*, ed. Hanne Jacobs, Husserliana Materialien IX, (Dordrecht: Springer, 2012), 195–97.

These considerations lead us back to Husserl's own analysis of Galileo's mathematization of nature. Let us recall that Galileo was the heir to a highly sophisticated tradition of measurement techniques and applied mathematics. Geometry had already displayed its virtues in the study of shapes, distances and movements. The example of astronomy should suffice. However, space, time, and movement are far from exhausting the full concreteness of natural objects and processes. Geometry, chronometry and pure kinematics, by themselves, are unable to ground a science of material bodies, although they can objectify an abstract layer of their properties. This situation motivated Galileo's breakthrough:

*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 fulfils 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*?¹⁵*

This idea grounds modern mathematical physics: the idea that all “aspects” of perceivable material nature, including all sensible qualities and causal features can be replaced by exact mathematical counterparts in a world of “shapes”. This idea remains, however, a hypothesis, one that in *Philosophy's Nature* I call *Galileo's hypothesis*.¹⁶ It is a hypothesis, as Husserl explains, of a peculiar kind, whose verification is the infinite process of the history of physics. This conclusion can be now rephrased in the following way: being mathematizable does not belong to the essence of life-worldly nature. Its physical objectivation is an infinite task, whose infinite distant *telos* is the ~~truth~~ nature in itself. Yet, there is no a priori guarantee that such nature (N_s), such truth, even exists. We can imagine the extreme case of the kenoworld, but we can also imagine intermediate cases, whereby the process of objectivation after the style of mathematical physics becomes impossible beyond of a certain level of exactitude. It would be a case in which Galileo's hypothesis, in due course, proves sterile. Modern physics sets truth in itself as a *telos*, *episteme* as a *telos*. Yet, we do not discover this *telos*, but postulate it, and place it at the heart of the life-world. It is a *telos* presupposing the peculiar mode of being of the life-world.

4 On Wiltsche's coordination problem

Expressed in transcendental terms, the sameness thesis *implies* that the community of transcendental subjects constitute first N_p and subsequently N_s as a further layer (and a higher-order transcendency) presupposing N_p . Talk about “constitutive layers” is frequent in phenomenology, but not all layering occurs according to the same structural form. The constitution of the casual properties, such as elasticity or fragility, presupposes the constitution of the mere sensuous schemata of a thing, and, pending the appropriate

15 Edmund Husserl, *Die Krisis der europäischen Wissenschaften und die transzendente Phänomenologie: Eine Einleitung in die phänomenologische Philosophie*, ed. Walter Biemel, Husserliana VI (The Hague: Martinus Nijhoff, 1954); English translation: *The Crisis of European Sciences and Transcendental Phenomenology*, trans. D. Carr (Evanston: Northwestern University Press, 1970), 31/33.

16 Trizio, *Philosophy's Nature*, 233–34.

genetic history, such causal properties are “directly experienced” on the things of perception. Similarly, the constitution of the value-use of an object presupposes its underlying thing constitution, and supplements it with a character immediately recognizable to those who are familiar with it. The relation between N_p and N_s is different, though, and, while the sameness thesis does imply the preliminary constitution of N_p , it states, furthermore, that N_s *does not add to but replaces* N_p . We do not constitute “scientifically true” objects that are both colored and endowed with certain optical properties, both warm and made of atoms oscillating with a certain mean kinetic energy. Thus, N_s cannot *be* without N_p , and yet it replaces it. This paradoxical relationship, to be sure, reflects the different intentional modalities in place, perceptual in one case, intellectual/idealizing in the other; but it also harbors the sense of Husserl’s breakthrough concerning the very notion of scientific truth, of *episteme*. This breakthrough amounts to the discovery of the principled inseparability of *episteme* from the doxastic ground of its manifestation, its being an infinitely distant *telos* that inhabits a subjective-relative life-world.

When we try to step back and reconsider the unity of the life-world (i.e., *the world*) in light of the *teleological inclusion* of N_s in it, several questions arise. One question that has not received enough attention both by Husserl himself (at least explicitly) and by subsequent phenomenologists concerns the relation between the subjectivity that acts freely and according to motivations in the life-world, on the one hand, and the causal/explanatory style of a physicalistic nature inhabiting the abstract core of the same life-world, on the other. Do we have a clear coherent picture of this relation? Do we have a coherent account of the interplay between causality, conditionality, and motivation? I am not sure. Wiltsche focuses on another fundamental issue, which concerns the *epistemic relations* between N_p and N_s , *the problem of coordination*, as he aptly calls it. Wiltsche then spells it out by means of three questions. The first concerns the predictive/explanatory value of N_s for N_p , the second concerns the grounding epistemic function of N_p for N_s , while the third is about the epistemic evaluation of different versions of N_s as theoretical determinations of N_p .¹⁷ Wiltsche has also gone a long way correctly answering these questions from my own point of view. Indeed, I am against the position that he calls “phenomenological quietism”, much for the same reasons that Wiltsche mentions, i.e., that it runs against what I take to be the very thrust of transcendental phenomenology. The famous bracketing of all scientific theories that phenomenology enacts does not imply giving up normative claims about the aim and possible validity of a scientific theory in the least. To think so means to forget that the *epoché* is the method underpinning phenomenology *qua* transcendental theory of knowledge. The phenomenologist suspends the validity of scientific knowledge, while keeping in view the question of what the essence of valid scientific knowledge is. In the case at hand, phenomenology works out the essence of the valid knowledge of a possible nature whatever. Thus, to go back to our problem, N_p and N_s can never count as two constitutive performances laying side-by-side, whose validity and mutual relations would remain out of consideration. Nor is any agnosticism countenanced. The transcendental attitude is the attitude apt to render thematic this issue and to reflect on the cognitive life that takes place in the natural attitude.

Wiltsche is also right in attributing to me both transcendental optimism and life-world foundationalism, which, indeed, I consider to go hand in hand, and to give a satisfactory answer to the first and to the third of his questions. The challenge that he directs at

17 Wiltsche foregrounds the role of different space-time theories.

transcendental optimism, though, is extremely interesting. It stems from the second of the questions making up the coordination problem: “How can the behavior of objects within N_p be of central epistemic importance for our doxastic attitudes regarding N_s ?”¹⁸ At first sight, given what we know about the constitutive priority of N_p over N_s , this question would hardly seem difficult to answer. After all, any evidence for the validity of scientific hypotheses must be traced back to things and processes that we can directly perceive. However, Wiltsche evokes the very spectacular turn of events determined by Quantum Field Theory and by its very counterintuitive implications concerning the space and time we experience. Such implications go far beyond the already unsettling claims of General Relativity. As usual, to cast light on the real ontological consequences of a physical theory is a daunting task, one that steers controversy among the relevant experts. As far as I can see, a clear and effective formulation of such consequences has been given by Carlo Rovelli, who answers the question “what is the world made of in light of Quantum Field Theory” in the following way:

The backdrop of space has disappeared, time has disappeared, classic particles have disappeared, along with the classic fields. So what is the world made of?

The answer now is simple: the particles are quanta of quantum fields; light is formed by quanta of a field; space is nothing more than a field, which is also made of quanta; and time emerges from the processes of this same field. In other words, the world is made entirely from quantum fields [. . .].

These fields do not live *in* spacetime; they live, so to speak, one on top of the other: fields on fields. The space and time that we perceive in large scale are our blurred and approximate image of one of these quantum fields: the gravitational field.

Fields that live on themselves, without the need of a spacetime to serve as a substratum, as a support, and which are capable by themselves of generating spacetime, are called ‘covariant quantum fields’. The substance of which the world is made has been radically simplified in recent years. The world, particles, light, energy, space and time – *all of this is nothing but the manifestation of a single type of entity: covariant quantum fields.*¹⁹

Thus, as it seems, even the space-time of General Relativity is no longer a fundamental structure of the universe, let alone our familiar three-dimensional space. Wiltsche draws the conclusion that, according to Quantum Field Theory, “conventional three-dimensional space and the N_p events within it are exactly that, *an illusion*”.²⁰ Thus, given that any possible evidence for such theory requires the existence of this conventional three-dimensional space, transcendental optimism about the epistemic status of physical theories would, at least in this case, undermine itself. Furthermore, the phenomenological thesis that the life-world is the sense-fundament of scientific theories would only

18 Wiltsche, *infra*.

19 Carlo Rovelli, *La realtà non è come ci appare* (Milano: Raffaello Cortina Editore, 2014); English translation: *Reality Is Not What It Seems*, trans. S. Carnel and E. Segre (New York: Riverhead, 2017), 193, emphasis added. Accepting Rovelli’s formulation does not imply subscribing to his implicit understanding of concepts such as “substance” and “manifestation”.

20 Wiltsche *infra*.

make things worse, for Quantum Field Theory would undermine not only its epistemic basis, but also its very meaning.

Indeed, when theories make assertions that seem to be at odd with what is most certain to us, one is tempted to demote them to the status of mere mathematical devices useful to make predictions or to systematize existing bodies of lower-level theories. If perceived nature were an illusion, so would be the life-world, which, as we know, is unconceivable without it. However, setting aside in this context the world annihilation evoked by Husserl, the uncanny scenario of our life-world (and, consequently, of our life-in-the-world) discarded as a superseded hypothesis like ether and phlogiston should not worry us. We can state with the highest confidence the following principle: *no meaningful physical theory could ever imply that the life-world is an illusion*. As we have seen, a physical theory is, by definition, a hypothesis about an aspect of perceived nature, which is, in turn, a component of the life-world. Indeed, in light of our previous discussion, Rovelli's claim that the *world* is made of covariant quantum fields should be rephrased as follows: "*material nature* is made of covariant quantum fields". Certainly not the "personal world" in which the community of scientists experiment, think and communicate. As we have seen, the life-world keeps physical theory on the leash, and there is a physical truth in itself only *insofar as* the life-world allows, and *so long as it does*. According to Galileo's hypothesis, the true world of physics might turn out to be an illusion, not the life-world. The life-world makes all scientific hypothesis possible, and does not partake in any "holistic game" of refutation and mutual adjustment of scientific beliefs, *pace* Quine.²¹ Should we then assign to Quantum Field Theory the status of a mathematical score which, when played with the instrument of our ontological notions yields nothing but non-sense? I will try to argue that this is not necessary and that *more* transcendently optimistic solution is available.

Let us go back to Husserl's account of the relation between N_p and N_s . As we know, Husserl formulated it in the language of classical physics, along with its more familiar spatiotemporal structure. However, already within ~~to~~ such a classical account, it does make sense to say that reality is not what it seems, or, better, that reality is not *as* it seems. Take the example of color. Colors do not belong to material nature as it really is; they belong only to material nature as it appears to us and to other living beings similar to us. Does it mean that colors are an illusion? I don't think so. To be sure, hyletic colors, which are safely harbored in the immanence of subjective life, really exist. But the "transcendent colors" resulting from the objective apprehension of the hyle are no illusion either. They are *perspectival*, not illusory; they are characteristic of the way material objects legitimately appear to us, and they inform us in a coherent way on some of the causal features of such material objects. An illusion is not the carrier of valid knowledge. A perspective, instead, is the carrier of valid knowledge *in disguise*. Such is the case of colors. Space and time, and movement, too, have their intuitive perceivable aspects, to which there correspond quite different idealized counterparts, so much so that we are unable to perceive or imagine even the down-to-earth idealized space of Euclidean geometry. Thus, within this classical framework, perceptual space, time, and movement are carriers of disguised knowledge too. Yet, their "disguise" is of a different nature than in the case of colors,

21 One should also add that neither the phenomenological theory of science, nor any other epistemological conception according to which scientific theories owe their justification to the results of experimental activities would be able to salvage a theory denying the existence of these very activities.

because the idealized counterparts of space, time, and movements are fundamental and necessary components of the substructured nature of classical physics. So much so that, as I have anticipated, Husserl thought that the idealization of space, time, and movements (and, indeed also of force), in their classical form, could give rise to the material a priori science of any possible nature whatever, i.e., to the a priori material ontology of nature. This would be the doctrine of *natura formaliter spectata*, as Husserl says, resorting to a famous Kantian expression. This conception, as I have already said, is contradicted even by Special Relativity. Now, insofar as Quantum Field Theory is a meaningful theory, it should not be taken to imply that space and time are illusions, but only that space and time as such, even in their idealized forms, are perspectival, so that they do not appear among the ultimate constituents of reality. This is also what Rovelli seems to imply at the end of the passage quoted above.

In conclusion, I can formulate my answer to this aspect of the coordination problem in the following way: what counts as evidence for a physical theory manifests to us *in disguise*, but it does so in a such way that it can still support the validity (or lack thereof) of the theory in question.

I would like to add two final remarks. First, Husserl's picture of a life-world whose spatial and temporal intuitive forms give rise to ideal, a priori sciences valid for any possible material nature, and, thus, setting a priori conditions for any possible physical theory, is quite reassuring. In such a picture, physical theory remains in the proximity of the world that is familiar to us. The leash that ties it to the life-world remains quite short. Contemporary physics has increasingly made that leash longer, to the point that the idealized material nature of physical theory appears now as an uncanny presence haunting the life-world and escaping our power of representation. What remains, thus, of the more reassuring picture we find in Husserl's text? What remains is that space and time, even the intuitive ones, can never be perspectival in the sense in which colors are. Colors do not even belong to the essence of any life-world whatever, space and time do. No world can appear to any subjectivity without them. Since space and time are a priori form of any possible world, of any perceivable material nature whatever, they belong, unlike colors, to the sense-fundament of any possible physical theory. This entails that any conceivable physical theory, including Quantum Field Theory is necessarily a higher-level determination of perceptual, intuitive material nature, which has a spatial and temporal form. This in turn sets the condition that any such theory must account for an idealized version of space and time. We do not have an a priori part of physics, as Husserl hoped, but we can still claim that not every mathematical theory is apt to describe a possible material nature, even one wildly different from the really existing one. The spatiotemporal form is the a priori form of perceivable nature, i.e., of the *manifestation* of any conceivable mathematized, i.e., substructured nature. If this does not lead to the *natura formaliter spectata* envisioned by Kant and Husserl, it is still possible to speak of a *manifestatio naturae formaliter spectata*, the formal consideration of the perspectival, perceivable nature. Even if there were no a priori form at all of objective, substructured nature, there would still remain the a priori form of its necessary manifestation; no matter how difficult it is, to work it out in detail. Furthermore, the being of any possible mathematized nature is inseparable from such a priori form.

The second remark concerns Wiltsche's doubts about whether life-world foundationism can be upheld in the case of the complex mathematical concepts used in today's physics. On this point, French is much more pessimistic:

To suggest that the very foundations of science must be grounded in the life-world and, even further, in transcendental subjectivity, may strike some – and today’s philosophers of science, especially – as a radical move. It might gain some traction when it comes to psychology, perhaps [. . .], but surely it loses all plausibility as far as physics, say, is concerned?²²

Surely, Hilbert spaces, unlike straight lines and circles, seem to be quite distant from anything that can be experienced in the life-world. Yet, the phenomenologists must not only ask what something is, but also *where it comes from*. In what way could a knowing subject ever make contact with something like the abstract mathematical objects of today’s mathematics? The analyses made by Husserl in *Origin of Geometry* has an exemplary nature, and they are meant to apply also to formal structures of any kind. The idea is that it should be possible to show that they, too, originate, through different steps, from the direct acquaintance with the individual objects of our experience, *starting with numbers*. Wiltsche is right in saying that tracing the origin of these formal structures to the life-world remains largely a research project, and some philosophers of mathematics might have strong objections against it, not least for the role that intuition would play in such a research. However, one should not deem it wrongheaded simply on the account of the complexity of contemporary mathematics.

5 Conclusion

The relation between, on the one hand, the life-world, and, on the other, the mathematized nature of modern physics raises a number of questions that Harald Wiltsche jointly characterizes as the *problem of coordination*. I have tried to show that these questions can find a satisfactory answer from a phenomenological point of view, if we hold fast to what we can call the *phenomenological subordination* of the nature of mathematical physics to the life-world. The phenomenological subordination amounts to the constitutive primacy of the life-world and of the doxastic truth characterizing it. Scientists do not discover the world; they presuppose it. Taking seriously the concept of phenomenological subordination allows us to understand what physics is ultimately about, namely the mere (“*Bloße*”) material nature that manifests itself in perception. As we have seen, such uniform and homogenous objective domain is already a result. Material nature appears first within pre-scientific life, as the “natural substance” of the things we deal with in all sorts of non-scientific activities. In this sense, pre-scientific nature does not appear as a unitary, homogeneous domain, but only discontinuously. Mere material nature, as a uniform and homogenous objective domain given in perception, must be carved out from the life-world by means of an abstractive procedure. Natural science cannot grasp the essence of such abstractive procedure. The being of this nature is, thus, an absolute *dogma* for it. What scientists do is to take up the specific theoretical attitude that is correlated to such value-free and subject-free material nature, and they do so in the very moment in which they emerge themselves as a recognizable form of human purposeful life in the life-world. *Mathematical* physics requires a further step, which leads to the idealization of perceivable nature.

22 French, “Review of *Philosophy’s Nature*,” 348.

Thus, the concept of phenomenological subordination allows us to understand the origin of pre-scientific nature, perceivable nature, and substructured nature, respectively. It further leads to the *sameness thesis* between perceivable nature and substructured nature. The eidetic transcendental analysis of the foundedness of the latter in the former allows the recognition that the life-world keeps scientific truth, in a figure *if* speech, “on the leash”, and that there is as much scientific truth as the life-world allows and so long as it does. This means that no meaningful physical theory can imply that the life-world and its natural core are an illusion. The life-world is a precondition for the possibility of a physical theory. Furthermore, the form of this subordination also suggests that no matter how counterintuitive the implication of contemporary physical theories might be, they cannot affect the *form of the manifestation of the nature* they describe, but only its objective determination.

The resulting picture of the world is, indeed, quite intricate. The truth in itself of nature presupposes the existence of perceptual nature and of its spatiotemporal form, while at the same time degrading the latter to a mere manifestation of the former. On the other hand, the original temporal form of subjective life, and the spatial and temporal form of the social world and of human history cannot in principle be considered as a mere manifestation of a spaceless and timeless being in-itself, because such form is an essential component of their very being. Thus, on the one hand, space and time belong to the very “substance” of subjectivity and of the social world, while, on the other, they belong merely to the form of the manifestation of material nature. Holding the world together has never been such a difficult task as it is now.