

STUDIES
IN
NEO-KANTIANISM
8

The Neo-Kantian Reception of Schiller

Edited by Chiara Russo Krauss

Federico II University Press
fedOA Press

STUDIES IN NEO-KANTIANISM/8

SERIES EDITORS

Giovanni Morrone Università della Campania “L. Vanvitelli”

Roberto Redaelli Università degli Studi di Milano

EDITORIAL BOARD

Stefano Besoli Università di Bologna

Giuseppe D’Anna Università Cattolica del Sacro Cuore di Milano

Carmine Di Martino Università degli Studi di Milano

Anna Donise Università di Napoli Federico II

Luca Guidetti Università di Bologna

Andreas Funke Friedrich-Alexander-Universität Erlangen-Nürnberg

Christian Krijnen Vrije Universiteit Amsterdam

Sebastian Luft Universität Paderborn

Felice Masi Università di Napoli Federico II

Edoardo Massimilla Università di Napoli Federico II

Peter-Ulrich Merz-Benz Universität Zürich

Domenico Spinosa Università di Studi dell’Aquila

Andrea Staiti Università di Parma

Jing Zhao Beijing Huagong University

EDITORIAL STAFF

Sabato Danzilli Università di Catania

The Neo-Kantian Reception of Schiller / Edited by Chiara Russo Krauss. – Napoli : FedOAPress, 2026. – 315 p. ; 24 cm. – (Studies in Neo-Kantianism ; 8)

Accesso alla versione elettronica: <http://www.fedoabooks.unina.it>

ISBN: 978-88-6887-393-6

DOI: 10.6093/978-88-6887-393-6

All books published in this series are subject to full peer review prior to final acceptance.



Finanziato
dall'Unione europea
NextGenerationEU



Ministero
dell'Università
e della Ricerca



Italiadomani
PIANO NAZIONALE
DI RIPRESA E RESILIENZA

Questo volume è pubblicato nell'ambito del progetto PRIN 2022 "The neo-Kantian reception of Schiller between Platonism and Kantianism" (2022N2WTM4), finanziato dall'Unione europea – Next Generation EU.

© 2026 FedOAPress – Federico II University Press

Università degli Studi di Napoli Federico II
Centro di Ateneo per le Biblioteche "Roberto Pettorino"
Piazza Bellini 59-60
80138 Napoli, Italy
<http://www.fedoapress.unina.it/>

Published in Italy

Gli E-Book di FedOAPress sono pubblicati con licenza Creative Commons Attribution 4.0 International

The Neo-Kantian Reception of Schiller

Edited by Chiara Russo Krauss

Federico II University Press



fedOA Press

Table of contents

<i>Introduction. Schiller through the Prism of Neo-Kantianism</i> , CHIARA RUSSO KRAUSS	7
FREDERICK C. BEISER, <i>Schiller versus Post-Modernism</i>	15
SABATO DANZILLI, <i>Kuno Fischer: Schiller as a Bridge between Kritizismus and Romantik</i>	25
PAOLO PECERE, <i>Materialism, Ideals and Political Myths. Friedrich Lange's Interpretation of Schiller and its Legacy</i>	41
CHIARA RUSSO KRAUSS, <i>Friedrich Albert Lange's Project of Schillerian Kantianism as the Philosophy for the Industrial Revolution</i>	55
GERALD HARTUNG, <i>Wilhelm Windelband on Schiller's Transcendental Idealism as a Cultural Philosophy</i>	73
ROBERTO REDAELLI, <i>On the Margins of Neo-Kantianism. Schillerian Traces in the Baden School</i>	81
GIOVANNI MORRONE, <i>A "Disciple of Kant"? On the Strategies and Limits of the Baden Neo-Kantian Appropriation of Schiller</i>	91
DOMENICO SPINOSA, <i>Schiller as Kantian Vermittler for Goethe in Jonas Cohn's Critical Account</i>	111
CHRISTIAN KRIJNEN, <i>Actualizing Freedom. On Schiller's Relevance for South-West Neo-Kantianism</i>	131
STEFAN KLINGNER, RUDOLF MEER, <i>The Beautiful Soul: Schiller's Rupture with Kant from a Neo-Kantian Perspective</i>	149
GIAN PAOLO CAMMAROTA, <i>"True Idealism Is Realism". Schiller as the Poet of the Ideal in Hermann Cohen</i>	165

SCOTT EDGAR, <i>Noumenal Affection and Play in Hermann Cohen's Schillerian Aesthetics</i>	175
EZIO GAMBA, <i>Aesthetic Education and Self-Consciousness of Humankind. Friedrich Schiller in Hermann Cohen's Thought</i>	193
MATTIA PAPA, <i>The Presence of Schiller in the First Period of Natorp's Philosophy</i>	211
LUIGI LAINO, <i>"The Realm of Shadows": the Presence of Schiller in Cassirer's Philosophy of Science</i>	231
GIUSEPPE GUASTAMACCHIA, <i>The Unified Human Being: Schiller's Legacy in Dilthey's Critique of Mathematical Psychology</i>	251
FRANCESCO PISANO, <i>"Only in Error There Is Life". Nature and Idealization in Vaibinger and Schiller</i>	269
EDOARDO MASSIMILLA, <i>Schiller in Max Weber? An Open Question</i>	287
<i>Abstracts</i>	305
<i>List of contributors</i>	311

“The Realm of Shadows”: the Presence of Schiller in Cassirer’s Philosophy of Science

LUIGI LAINO

Introduction

To the best of my knowledge, Schiller’s name rarely appears in studies devoted to Cassirer’s philosophy of science. This is unsurprising, as Schiller is not among Cassirer’s principal references in this domain. Nevertheless, I shall argue that if Schiller’s thought is essential for understanding the neo-Kantian reinterpretation of Kant¹, it is reasonable to maintain that Schiller had bearing on Cassirer’s philosophy of science. This influence is evident in two of Cassirer’s central commitments: (i) the rejection of the copy theory of knowledge – that is, the notion that knowledge results from an abstract process aimed at reproducing reality ‘as it is’ –; and (ii) the development of Cassirer’s holism, arising from the generalisation of the understanding’s spontaneity in constructing representations of reality.

Regarding methodology and structure, the paper offers a historical reconstruction and contextualisation of Cassirer’s explicit references to Schiller in his epistemological writings, drawing on Cassirer’s works on Schiller only as an auxiliary resource to illuminate these references. The discussion is organised into five sections. The first examines early mentions of Schiller, dating back to 1907. The second explores how Schiller’s ideas contribute to explaining theoretical holism. The third analyses the reference that provides the title of this paper, found in Cassirer’s work on Einstein’s theory of relativity. The fourth briefly considers Cassirer’s engagement with Schiller in *Determinismus und Indeterminismus* and his appeal to his thought in defending the moral autonomy of human agents. The fifth section presents the concluding remarks.

1. *Mentions from 1907*

The reader may be surprised to learn that Cassirer’s references to Schiller in his epistemological writings appear at an early stage. In the second volume of *Das*

¹ On this point, see Beiser (2005; 2023).

Erkenntnisproblem, Cassirer draws on one of Goethe and Schiller's epigrams from *Xenien* to elucidate the task – namely, the “*Leistung*”² – of critical philosophy:

So deeply does the concept of absolute being seem to be embedded in the foundations of our knowledge, so insolubly is it apparently fused with them, that to attempt to isolate and abolish it is tantamount to the destruction of those foundations themselves. It is at this point that Kantian philosophy begins. The well-known epigram by Schiller truly applies to it: that it knows nothing of the thing and nothing of the soul. In its beginnings and its foundation, at the very least, it does not need to know this opposition; it does not need to acknowledge it as an original and self-evident one. The content of Kant's doctrine is not the self (or the 'I'), nor its relationship to external objects, but what it primarily concerns itself with is the lawfulness (*Gesetzlichkeit*) and the logical structure of experience (1907a, p. 553).

The epigram to which Cassirer refers is:

Von dem Ding weiß ich nichts, und weiß auch nichts von der Seele;
Beide erscheinen mir nur, aber sie find doch kein Schein (Kant).
Wir erkennen, ist das Hauptresultat der Kant'schen Kritik, kein Ding an sich, sondern nur Erscheinungen; unsere Erkenntnis realer Objekte ist daher auf Erfahrung beschränkt³.

The notion that knowledge does not concern ‘substances’ such as things or the soul had already appeared in Cassirer's early work on Leibniz and was clearly articulated within the Marburg School, particularly in Cohen (1883). The implication is that if we focus on the “lawfulness” and the “logical structure of experience”, we presuppose that there is no experience devoid of logical structure; consequently, objectivity is reduced to normativity⁴. This leads directly to theoretical holism and constitutes the first example of how a reading of Kantian philosophy – mediated through Schiller – can be specified in relation to issues within the philosophy of science.

The second reference from 1907 is even more striking, as it occurs in a technical paper on the philosophy of mathematics, *Kant und die moderne Mathematik* (Kant and modern mathematics). Here, Cassirer defends a neo-Kantian philosophy of mathematics against the logicist programme of Couturat and Russell. Cassirer was particularly concerned that reducing mathematics to logic gives rise to two problems: first, it encourages Platonism and a form of medieval realism regarding

² The term “*Leistung*” is used by Cassirer to defend the idea that transcendental philosophy entails the perpetual synthetic activity of the understanding in shaping reality. By way of example, the expression occurs several times in Cassirer's *Leibniz' System* (Cassirer 1902, p. 15 *et passim*).

³ *SA*, I, p. 267. “Of the thing I know nothing, and know nothing also of the soul; / Both merely appear to me, yet they are still not an illusion (*Schein*)” – Kant. The main result of the Kantian critique is that we recognise no thing-in-itself, but only appearances; our cognition of real objects is therefore limited to experience”.

⁴ As Cassirer later put it: “There is ‘objecthood’ (*Gegenständlichkeit*) or objective ‘reality’ (*Wirklichkeit*) because and insofar as there is lawfulness – not the other way around” (Cassirer 1937, p. 159).

the existence of mathematical objects, thereby confusing function-concepts with substance-concepts; second, it risks obscuring the relationship between theory and experience. Cassirer (1907b, p. 76) observes:

But with this, a problem is posed that lies completely outside the purview of 'logistics' and is thus not even touched by its criticism. All empirical judgments are beyond its domain: it stops at the boundary of experience [*an der Grenze der Erfahrung*]. What it develops is a system of hypothetical preconditions, but we can never know whether they will ever be realised in any experience, or whether they will therefore ever permit any mediate or immediate concrete application. According to Russell, the general concept of magnitude already falls outside the scope of pure mathematics and logic: it contains an empirical element that can only be given to us through sensory perception. Following the fundamental view of logistics, the task of thinking is completed when it has succeeded in establishing a strict deductive connection among all its structures and products. Concern for the lawfulness of the world of objects, however, is left entirely to direct observation [...] Logic and mathematics are only concerned with the order of concepts; the order or confusion among objects does not affect them and need not confuse them. Thus, no matter how far one might push the analysis of concepts from this standpoint, empirical being remains an eternally incomprehensible problem.

In this context, it is preferable to adopt Schiller's view that natural science and transcendental philosophy must be distinguished, though not in the sense of positing a rigid dualism between theoretical and merely conceptual structures on the one hand and sense data on the other⁵. Cassirer (1907b, p. 81) writes:

Perhaps the best description for the relationship between the two approaches to research and observation today is the statement Schiller made about the connection between natural science and transcendental philosophy: only when they separate in their searching, can the truth, at which they both aim, be recognised.

The reference here is to Schiller's epigram *Naturforscher und Transzendental-Philosophen*: "*Feindschaft sei Zwischen euch, noch kommt das Bündnis zu frühe; / Wenn ihr im Suchen euch trennt, wird erst die Wahrheit erkannt*"⁶. Significantly, these verses are

⁵ Cassirer associates empiricism with the idea that sense data constitute a primary source of knowledge. This is true, but not as naively as Cassirer sometimes suggests. In Russell (1914, pp. 80-103), physical objects are built as constructs and logical "fictions" over sense data. In Schlick, there is no trace of a copy theory of knowledge, since reality is organised through a hierarchy of principles (1918, §10, esp. p. 63), whose higher levels can be compared to Kant's synthetic a priori judgments. Later, Schlick (1932) would claim that all we speak about and know are "structures". Perhaps the difference is more a matter of attitude than of theory, given Russell's reliance on "common sense" regarding the denotation of actual men outside logic books (Russell 1951, pp. 53-54). Nevertheless, portraying empiricism as uniformly committed to the primacy of sense data would be a historical oversimplification. This is essentially Schlick's criticism of Cassirer (Schlick 1921). Finally, the formative role of empiricism may be typified by constructivist approaches such as van Fraassen's (2008), who argues that there is no need for a model to represent "appearances" (measurement results) as "phenomena" (observable entities).

⁶ *SA*, II, p. 110, nr. 153. "Let there be enmity between you; the alliance comes too soon; / If you separate in your search, the truth will only then be recognised".

dedicated to Schelling rather than Kant. This suggests that the relationship between philosophy and empirical science cannot be resolved in favour of the transcendental philosopher, who might otherwise claim the authority to interpret and rework scientific results as 'philosophical propositions'. Instead, philosophers should analyse natural science to uncover the principles that make it possible to apply mathematics to physical reality and to comprehend physical objects as mathematical constructs.

If we seek to develop this position in terms of theoretical holism, we must preserve a certain distinction between purely theoretical and empirical assertions. However, given that the scientific understanding of reality is always theory-laden, the only legitimate object of knowledge is the unity of what we call 'experience'. The implications of this argument will be examined in the next section.

2. 1910–1920: *Aesthetic Idealism, Theoretical Holism, and Conventionalism*

In this section, I proceed retrospectively from *Freiheit und Form* (Freedom and form, 1916), which contains an extensive chapter on Schiller, to *Substance and Function* (1910), where Cassirer adopts a particularly robust form of theoretical holism.

Freiheit und Form is Cassirer's first monograph on the philosophy of culture, and it is obvious that it devotes considerable attention to Schiller, one of the national poets and central figures of the German humanistic tradition. What is less obvious, however, is that the text also contains an indirect reference which, by drawing on the revision of Kant's philosophy in terms of aesthetic idealism, enables us to return to *Substance and Function* and clarify how holism emerges as a consequence of rejecting the copy theory of knowledge.

To begin with, two passages from the 1916 work are particularly relevant:

i) However, the purest relation between 'idea' and 'experience', the most perfect balance of the 'subjective' and the 'objective', was discovered by Schiller not as an artist, but as a thinker. Just as he praises critical philosophy for having opened the way to lead empiricism back to principles and speculation back to experience, so too did he constantly go through this dual path in the foundation of his aesthetics (p. 292).

ii) Our whole knowledge, as all philosophers agree, consists in a conventional illusion, with which nevertheless the strictest truth may subsist. Our purest conceptions are by no means images of things, but only their necessarily determined and coexisting signs. Neither God, nor the human soul [...] are actually that which we consider them. Our ideas of those things are only the endemic forms, through which the planet which we inhabit transmits them to us. Our brain belongs to this planet, consequently also the idioms of our conceptions which lie stored there. But the power of the soul (*die Kraft der Seele*) is peculiar, necessary, and ever like itself; the caprice of the material through which it expresses itself, does not alter the eternal laws by which that expression is made, so long as this caprice does not contradict itself, so long as the symbol corresponds to the thing symbolised. Just as reflection unfolds the relations of the idioms, these relations must actually exist in the things themselves (p. 294).

Schiller also added that "truth is no property of the idioms, but of the results – not the similarity of the symbol with the thing symbolised, of the conception with the object, but the agreement of this conception with the laws of reflection"⁷. It is difficult not to imagine that the whole passage could have been written by Cassirer himself. Concepts do not mirror reality; rather, they represent the way theoretical patterns articulate empirical relations by virtue of "the power of the soul", that is, the Kantian faculty of synthesis of the understanding. As long as the syntax of these theoretical patterns remains internally consistent, agreement between theory and the objects symbolised is possible.

How this connects with the philosophical context of Cassirer's time can be explained as follows. A key notion in late nineteenth- and early twentieth-century epistemology was that of "*Zuordnung*" – the "coordination" between theoretical structures and empirical data, such as those obtained through measurement (see Ryckman 2005, p. 27 *et passim*). Once again, it is evident that this idea was anticipated in Schiller's passage and that these claims were incorporated into *Substance and Function*, albeit within a broader and more systematic epistemological framework.

Speaking as a natural scientist, Schiller defends the conventional character of our theoretical principles on the basis of the brain's nature and its relation to the environment. This theme, to some extent, recalls Kant's claim in the *Universal Natural History and Theory of the Heavens* that the perceptual structure of living beings depends on the distribution of matter in the universe and their distance from the sun (see Kant 1755, En. tr. pp. 297 ff.). For the expert in epistemology, however, this perspective evokes von Helmholtz and Poincaré, and thus the idea that the principles by which we organise physical reality are not synthetic a priori judgements – apodictically valid – but rather "conventions", that is, analytic propositions "in disguise", employed with the aid of experience (Poincaré 1902, En. tr. p. 50) and coordinated with "the things themselves".

Cassirer appears to exploit Schiller's conventionalism in a distinctive way to interpret the principle of general relativity. The advent of Einstein's theory posed a challenge to neo-Kantian philosophy, for it asserted the empirical character of geometry. Indeed, however far one might go in revising Kantian philosophy, the conviction that geometrical concepts are not empirical should not be abandoned. It is therefore unsurprising that, inspired by Poncelet, Staudt, Klein, Poincaré, and Hilbert, among others, Cassirer reshaped Kant's notion into a more liberal view, attributing to geometry the status of a free creation of the human mind independent of experience⁸.

In his book on Einstein, Cassirer (1921, p. 39; En. tr. pp. 383–384) extends this claim, arguing that the principle of general relativity functions as an analytic prescription governing the mathematical form of physical laws – namely, that they

⁷ *SA*, XI, pp. 129–130; En. tr. pp. 369–370.

⁸ Cassirer often invokes Dedekind's motto and Cantor's conception of mathematics as a free and creative activity. See, for example, Cassirer (1910, p. 39; Eng. trans. pp. 38–39).

must exhibit invariance. Leaving aside technical and historical issues concerning the identification of invariance with general covariance⁹, we may say that scientific theories serve as reference points around which natural phenomena are made to revolve “almost arbitrarily”, while efforts are undertaken to incorporate specific theories into progressively broader theoretical frameworks (Cassirer 1921, p. 18; En. tr. p. 366). This is nothing but a reference to Schiller’s *Der Spaziergang*, which also appears in the course Cassirer delivered in the winter semester of 1920/21: “With that, despite all the relativity and all the divergence in our spatial and temporal measurements, we have nevertheless arrived back at a unity, which now forms the ‘resting pole in the flight of appearances’ – but ‘resting’ [...] in the pure sense of validity” (Cassirer 1920/21a, p. 82).

Schiller’s poem offered a universal history of human knowledge, which, in relation to the birth of modern science, declares that it

sucht das vertraute Gesetz in des Zufalls grausenden Wundern,
Sucht den ruhenden Pol in der Erscheinungen Flucht (133-134)¹⁰.

In sum, Cassirer appears to have recognised that descriptions of natural phenomena – centred on specific theories – cannot claim to represent the truth of physical reality as it is. Yet conventionalism is here tempered by Schiller’s notion of the “power of the soul”, as Cassirer’s exchange with Schlick illustrates. Schlick (1918, § 5, p. 22; § 10, pp. 62 ff.) explicitly emphasised the conventional character of scientific hypotheses as an interplay of “signs” and denied the existence of synthetic a priori judgements. In a letter to Schlick dated 23 October 1920, Cassirer (2009, pp. 50-51) clarified:

The difference amidst us, as far as I can see, does yet consist in the *concept of a priori*, which I represent differently as you do: i.e. not as it was a constant, a once and for all stationary entity connected to material ‘intuitions’ or concepts, but rather as a function, lawfully determined, which thereby remains identical in its way and form, but that in the development of knowledge can experience, as regards content, the most different shapes. I would like that as ‘a priori’, strictly speaking, may be valid only the thought of the ‘unity of nature’ (*Einheit der Natur*), viz. the legality of experience in general, or perhaps more briefly: the ‘uniqueness of coordination’ (*Eindeutigkeit der Zuordnung*). However, how this thought specifies itself into particular principles and premises: to me this becomes evident only by moving from the process of scientific experience, although I think I can never recognise here fixed schemata, but stable basic themes of knowing, viz. of researching and questioning. Thereby I must also confess that Kant had not distinguished rigorously enough between the general principle and its concrete accomplishment, thus I think that its doctrine needs a revision concerning this point. But, for sure, the uniqueness principle seems to me to be something more than a mere ‘convention’ or as an ‘inductive generalization’: it seems to me an expression of ‘reason’, of logos as such.

⁹ See Ryckman (1999).

¹⁰ *SA*, I, p. 138, En. tr. p. 213: “Seeks the familiar law in chance’s miracles dreaded, / Looks for the ne’er-changing pole in the phenomena’s flight”.

I shall not address the legitimacy of Cassirer's position, which also involves rejecting Schlick's arguments regarding probabilistic knowledge. My purpose is rather to show how Cassirer reappropriated Schiller's notion of the "power of the soul" in order to ground a neo-Kantian philosophy of physics, identifying unambiguous lawfulness as the sole genuine a priori.

It is worth noting that, in *Erkenntnistheorie nebst den Grenzfragen der Logik* (Theory of knowledge alongside the border questions of logic), Cassirer had already criticised Vaihinger's fictionalism on similar grounds (Cassirer 1913, pp. 180-185). If we assume that all concepts and theories are mere "fictions", we must conclude that all knowledge becomes a form of "art" or *Kunstlehre* (Vaihinger 1911). By contrast, from an empiricist or positivist perspective, one must either affirm the reality of sense data or the existence of lawful connections. Choosing the latter leads to Marburg's scientific idealism, which, as I have suggested, defends *Zuordnung* as the a priori "fact" or "condition" of reason.

Although this may appear an old-fashioned conception of science when compared with the neo-empiricist view, the radical interdependence of theory and experience that it asserts offered a strikingly modern interpretation of scientific practice. It is therefore worth taking a step back to examine how this approach was systematised in the 1910 work.

In *Substance and Function*, Cassirer begins by rejecting the copy theory of knowledge, observing that "no matter how complete our knowledge may be in itself, it never offers us the objects themselves, but only signs of them and their reciprocal relations" (1910, p. 327; En. tr. p. 303). He further maintains that no single observation can verify a theoretical assertion. Cassirer's position (1910, pp. 288 ff.; En. tr. pp. 266 ff.) can be illustrated by the following diagram:

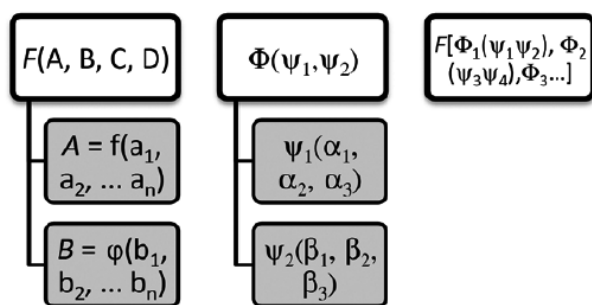


Figure 1. A holistic representation of the theory of the invariants of experience presented in *Substance and Function*.

F denotes a set of relations among groups of phenomena (A , B , etc.); in turn, A , B , and so forth can be decomposed into smaller constituents (f as correlating a_n , etc.). This yields a network of "syntheses" that illustrates, at various levels, how we

organise natural knowledge, such that no observational statements fall outside the domain of theory¹¹. Indeed, even ψ_n , which likely represents empirical laws connecting the “elements” of two fields, A and B – namely, α_n and β_n – remains intratheoretical. Φ signifies a new relation that initiates the search for increasingly general laws and indicates the direction of theoretical development. When “assured observations” fail to accord with F , modifications are introduced “from within outwards”, meaning that we adjust ψ_n while striving to preserve the overarching framework. Cassirer emphasises, however, that revisions may affect the most universal principles, so that the latter should never be regarded as “unchanging dogmas”.

In a recent essay on Cassirer’s theoretical holism, Alan Richardson contrasts this model with Quine’s account and observes:

Physics progresses by heading back to theory perhaps to reformulate laws, perhaps to remodel the experiment [...]. Neither the laws nor the facts are established until harmony is achieved between them. The goal of mathematical science is to subsume and explain all such facts – when this happens, we have ‘the entirety of experience’ as a determinate object of knowledge (Richardson 2015, p. 118).

Richardson thus argues that Cassirer’s holism is more coherent than Quine’s, as it acknowledges the impossibility of drawing a sharp distinction between theoretical and observational statements. Richardson (2015, pp. 118–119) continues:

It is easy to see that Quine’s holism of theory-testing and even his eventual “web of belief” are not holistic enough. The offerings of sensation against which Quine claims science is tested stand as facts outside the scientific system: Quine attends neither to the issue of the scientific form of the facts nor to the ways in which changes to theory induced by acceptance of this fact eventually lead to theories that alter the understanding of the fact itself. Quine is a Baconian, whose epistemology presupposes a gulf between theory and fact, for whom experience “impinges” on the web of belief from the outside. For Cassirer science always works from within: the epistemological problem occurs when facts and laws, both couched in theoretical language, diverge; it is solved when the divergence is resolved.¹²

What I have sought to demonstrate in this section is that Cassirer’s theoretical holism overlaps with his later discussion of Schiller’s *Philosophical Letters* and aesthetic idealism. Given that Cassirer referred to Schiller even before 1916 in a man-

¹¹ On this, see also Ihmig (2001, pp. 102–126).

¹² Quine’s holism (Quine 1980, pp. 20–46) is grounded in his critique of the so-called two dogmas of empiricism: (i) the distinction between analytic truths – true by virtue of meaning – and synthetic propositions, which, in the absence of synthetic a priori judgments, gives rise to (ii) “reductionism”, the view that theoretical statements can, in some way, be reduced to observations and “immediate experience”. Quine nevertheless assigns a significant role to “recalcitrant experiences”, for his aim is to show that “no statement is immune to revision”. This leads him to endorse a more conventionalist form of holism than Cassirer’s and to claim that physical objects are “myths” preferable to “Homer’s gods” (Quine 1980, pp. 43–44). While this stance appears consistent with Cassirer’s aesthetic idealism and his philosophy of symbolic forms, the crucial point is that Quine frames this preference as a matter of belief (Quine 1980, p. 44).

ner consistent with holism as a natural consequence of rejecting the copy theory of knowledge, there is little risk of overstating this influence or denying its translatability. The strictly intratheoretical character of a theory-laden, holistic epistemology can be elucidated through Schiller's notion of "the power of the soul", which serves as the analogue of what Cassirer, in 1907 and 1910, terms "*erzeugende Relation*"¹³ – that is, the synthesis generating the elements of a given mathematical structure. At the same time, the fact that we acknowledge and engage with observations ensures that theoretical relations remain empirically testable, so that the existence of relations in things enables us continually to reassess the concordance between theory and experience. Cassirer likely regarded this as Kantian in spirit, at least for these three reasons: (i) knowledge does not concern things in themselves but the ways in which we represent and construct them; (ii) if knowing does not entail copying external objects, then the foundation of knowledge lies in the activity of the understanding, which spontaneously shapes the external world; nevertheless (iii) we cannot transcend the bounds of experience.

In short, Cassirer acknowledges receptivity, yet assumes that our access to experience is mediated: we apprehend sense data via observational statements that already participate in the theoretical fabric of science.

Let us now consider how these ideas develop in Cassirer's writings on relativity.

3. *Relativity and "The Realm of Shadows"*

In a passage discussing Minkowski's well-known critique of the existence of space and time as separate forms of experience, Cassirer observes

this demand contains nothing terrible for the critical idealist, who has ceased to conceive space and time as things in themselves or as given empirical objects. For the realm of ideas is for him a "realm of shadows", as Schiller called it, since no pure idea corresponds directly to a concrete real object, but rather the ideas can always only be pointed out in their systematic community, as fundamental moments of concrete objective knowledge (1921, p. 86, En. tr. p. 424).

Here again, we encounter both holism and Schiller. Interestingly, Minkowski (1909, En. tr. p. 39 mod.) also began his celebrated address by invoking the notion of "shadows":

Gentlemen! The intuitions (*Anschauungen*) of space and time which I want to present to you arose from the domain of experimental physics, and therein lies their strength. Their tendency is radical. From now onwards space by itself and time by itself will recede completely to become mere shadows and only a type of union of the two will still stand independently on its own.

¹³ See Cassirer (1907b, p. 59 *et passim*; 1910, p. 14 *et passim*, En. tr. p. 15 *et passim*).

The key question, then, is how to interpret the term “shadow”. Cassirer clearly had in mind the first version of *Das Ideal und Das Leben*, originally published as *Das Reich der Schatten*. In his essays on Schiller, he repeatedly returns to this theme and stresses how misleading the alteration of the thirtieth line was:

Nur der Körper eignet jenen Mächten,
Die das dunkle Schicksal flechten;
Aber frei von jeder Zeitgewalt,
Die Gespielin seliger Naturen,
Wandelt oben in des Lichtes Fluren
Göttlich unter Göttern die Gestalt.
Wollt ihr hoch auf ihren Flügeln schweben,
Werft die Angst des Irdischen von Euch,
Fliehet aus dem engen, dumpfen Leben
In der Schönheit Schattenreich.

Nur der Körper eignet jenen Mächten,
Die das dunkle Schicksal flechten;
Aber frei von jeder Zeitgewalt,
Die Gespielin seliger Naturen,
Wandelt oben in des Lichtes Fluren
Göttlich unter Göttern die Gestalt.
Wollt ihr hoch auf ihren Flügeln schweben,
Werft die Angst des Irdischen von Euch,
Fliehet aus dem engen, dumpfen Leben
In des Ideales Reich!¹⁴

From these excerpts, we may infer that the creation of forms requires transcending the senses without fearing that the outcome will be mere “shadows”, since forms are not mere copies of things. This view evokes a kind of Platonism, although here the status of “shadows” is attributed to ideas rather than to their imitations. In a sense, it represents a form of idealism that responds to the empiricist claim that ideas are faint impressions (Hume 1739, I, sec. VII, pp. 142–147). Indeed, a neo-Kantian such as Cassirer faced a challenge analogous to that which Hume posed to Kant, particularly given the Humean influence on later philosophy of science. Just as Kant sought to secure the synthetic activity of the understanding against scepticism, Cassirer had to defend it against conventionalism, as seen earlier in his debate with Schlick.

It is striking that the third chapter of Cassirer’s book on Einstein undertakes a detailed analysis of the relationship between relativity and scepticism. Although Schiller’s name does not appear here, the argumentative strategy relies on rejecting the copy theory of knowledge, as Schiller had advocated. Since the possibility that concepts merely reproduce things has been ruled out, the absence of an absolute representation of reality does not entail any sceptical conclusion. On the contrary, the principle of general relativity guarantees that observations are theoretically mediated and systematically interconnected, so that experience is constituted as an integrated whole grounded in a network of mathematical equations (Cassirer 1921, pp. 392–393). It follows that if ideas – understood as theoretical relations – do not originate in things and are themselves “shadows”, then observational statements tied to “things” cannot serve as a means of verification of theoretical propositions.

With respect to space and time, these are simply factors that organise experience within a broader conceptual network (including, for example, matter, electric charge, and so forth), but they do not correspond to any real objects. This feature of scientific thought becomes even more pronounced in general relativity. Without

¹⁴ Original version quoted in Cassirer (1920/21b), p. 59; *SA*, I, p. 192.

entering into technical details¹⁵, we may assume complete freedom in selecting the geometry through which measurements are expressed, such that the only satisfactory form of knowledge is the logical consistency between a chosen axiomatic system and the relevant observations. Cassirer (1921, pp. 50–51, En. tr. p. 393) writes:

According to the critical view, the object is no absolute model to which our sensuous presentations more or less correspond as copies, but it is a "concept, with reference to which presentations have synthetic unity". This concept the theory of relativity no longer represents in the form of a picture but as a physical theory, in the form of equations and systems of equations, which are covariant with reference to arbitrary substitutions. The "relativisation", which is thus accomplished, is itself of a purely logical and mathematical sort. By it the object of physics is indeed determined as the "object in the *phenomenal world* (*Erscheinung*)"; but *this* phenomenal world no longer possesses any subjective arbitrariness and contingency. For the ideality of the forms and conditions of knowledge, on which physics rests as a science, both assures and grounds the empirical reality of all that is established by it as a "fact" and in the name of objective validity.

In this sense, when compared with the vividness of sensuous reality, an "idea" may appear as a mere shadow; yet this very characteristic is essential to understanding what it means to know. The "relativisation" achieved by relativity theory is purely mathematical, so that the objects it encompasses are shadows generated by theory. From a phenomenal standpoint, we must conclude that there are no facts without theory, as Cassirer often repeats with Goethe¹⁶.

Therefore, the trajectory from Schiller to epistemology can be summarised as follows: Cassirer interprets, on the one hand, Schiller's notion of "the power of the soul" as the spontaneity of the understanding in generating axiomatic systems; on the other, he acknowledges the role of experience in determining which system of axioms is appropriate, since theoretical relations must ultimately correspond to "the things themselves". This contribution of experience, however, should not be understood in a largely passive sense. If observational statements can be identified – and thus a distinction drawn between theoretical and empirical assertions – this is possible only because observational claims are themselves theory-laden.

Accordingly, the distinction between the pure and empirical components of scientific theory, and the related question of their agreement, should not be construed as implying complete heterogeneity. In Kantian terms, this can be expressed by say-

¹⁵ In essence, Cassirer interpreted general relativity as marking a shift toward a purely functional and formal conception of physical theory, since every reference to empirical constraints (such as the constancy of the speed of light) is abandoned. He also emphasised the principle of active general covariance, which allows for the generation of multiple metrics for given spacetime regions (see Ryckman 2005, pp. 16–19). This point is vividly illustrated by the so-called "hole argument" (see Ryckman 2005, pp. 19–22), of which Cassirer was, however, unaware (Ihmig 2001, p. 158).

¹⁶ See, e.g., Cassirer (1914, p. 185). The history of physics abounds with such episodes. For instance, when the young Heisenberg confessed to Einstein during a walk that he had been inspired by relativity theory and its positivistic spirit, Einstein replied: "Only theory decides on what we can observe" (*Erst die Theorie entscheidet darüber, was man beobachten kann*). See Heisenberg (1971).

ing (Cassirer 1921, pp. 104–105, En. tr. p. 440) that relativity does not enable the coexistence of multiple real spaces, but rather “the possibility or necessity of applying different measurements, i.e., different geometrical conceptual languages in the interpretation of certain physical manifolds”. Cassirer (1921, p. 108, En. tr. p. 443) thus remarks:

It is not experience that grounds the content of the geometrical concepts; rather these concepts foreshadow it as methodological anticipations [...]. When they first appeared, the systems of non-Euclidean geometry seemed lacking in all empirical meaning, but there was expressed in them the intellectual preparation for problems and tasks, to which experience was to lead later.

Cassirer’s holism is therefore justified by a particular conception of the scientist’s task: the creative invention of models for interpreting natural phenomena. Scientists employ the “power of the soul” to construct mathematical representations that will ultimately be applied to reality, so that:

Thought does not advance in the field of the concrete by dealing with the particular phenomena like pictures to be united into a single mosaic, but by sharpening and refining its own means of determination while guided by reference to the empirical and by the postulate of its determinateness according to law (Cassirer 1921, p. 109, En. tr. p. 444).

It is difficult not to perceive a parallel between the work of the scientist and that of the artist: both shape the world through spontaneous and creative activity.

The final chapter of Cassirer’s book is particularly revealing in this respect. Science is portrayed as a human endeavour aimed at producing objective, non-anthropomorphic representations of physical reality – an undertaking that is, paradoxically, interpreted as anthropomorphic (Cassirer 1921, p. 111, En. tr. p. 445).

Later, in the third volume of the *Philosophy of Symbolic Forms*, Cassirer elaborates on this point in his discussion of Eddington’s interpretation of general relativity. Eddington adopts a subjectivist and, to some extent, “transcendental” perspective, combining the abstract mathematical language of general relativity (the “world-geometry”) with the specific spacetime partitions resulting from the observer’s interaction with physical reality. Consequently, the features of nature that appear in scientific knowledge – such as invariance – are less intrinsic properties of reality than conditions imposed by the mind¹⁷. Yet, in his widely read *Space, Time and Gravitation*, Eddington (1920, p. 30) described relativity as offering a view of nature “from the point of view of no one in particular”.¹⁸ This stands in tension with aesthetic ide-

¹⁷ On the complex interpretation of Eddington – who was also influenced by Clifford’s panpsychist and monistic metaphysics – see Hentschel (1990, pp. 473–480).

¹⁸ And he continues by saying: “Whether we are able to go still further and obtain a knowledge of the world, which not merely does not particularise the observer, but does not postulate an observer at all; whether if such knowledge could be obtained, it would convey any intelligible meaning; and whether it could be of any conceivable interest to anybody if it could be understood these questions

alism, for scientific objects, like cultural ones, are created by subjectivity¹⁹ – by the “power of thought” (*Denkkraft*). Significantly, in this context Cassirer (1929, p. 555, En. tr. p. 478) asserts that physics “cannot jump over its own shadow”, deliberately invoking Schiller’s key metaphor.

To conclude this section, I shall cite two passages²⁰ from works explicitly devoted to Schiller, which help to complete the picture outlined thus far. It is worth noting that *Idee und Gestalt* was published in 1921, while the posthumous volume *Schillers philosophische Weltansicht* (Schiller’s philosophical worldview) originated as a series of public lectures delivered at the University of Hamburg during the same semester in which Cassirer taught on relativity.

The first passage, from *Idee und Gestalt* (Idea and form), reads:

Thus, beauty is not an empirical concept (or concept of experience), but an imperative. It is objective, not insofar as we can point it out as a necessary component in the structure of the world, but insofar as it lies before us as a necessary task of our spiritual, our ‘sensibly-rational’ nature (Cassirer 1921/24, pp. 329–330).

Here, we move beyond the Greek ideal of *καλοκάγαθία*. As an imperative, beauty demands that human beings pursue it as the regulative goal of their activity. This implies that what we take to be the external component of knowledge – namely, the objects that appear before us – is in fact the outcome of our unceasing imperative to shape the world. Science is no exception, and this insight paves the way for the argument developed in the third volume of the *Philosophy of Symbolic Forms*. Viewed from this perspective, Cassirer’s holism emerges as the only viable epistemological stance, given the aesthetic imperative to form and configure reality. Objectivity, therefore, can manifest only under a theoretical guise.

The second excerpt reinforces this interpretation:

Only now, after we have assured ourselves of the conceptual framework of Schiller’s view of art and Schiller’s worldview, do we turn to the poem *Das Reich der Schatten*, which in a later version was given the title: *Das Ideal und das Leben*. Fundamentally, the earlier title is the more descriptive one [...]. But the realm of shadows is much more the realm of forms – and thus the true realm of life – but a life that no longer adheres merely to raw matter and is consumed by the mere material drive; rather, one that is realised and perfected in play (*Spiel*) and in image (*Bild*), in pure form (*Gestalt*) (Cassirer 1920/21b, p. 61).

need not detain us now. The answers are not necessarily negative, but they lie outside the normal scope of physics” (Eddington 1920, p. 31). Eddington’s openness on this point may have prompted Cassirer’s criticism.

¹⁹ In Cassirer scholarship, it is well known that the philosophy of symbolic forms pivots – though with significant differences – on Hegel’s objective spirit (see at least Skidelsky 2008, pp. 105–109; Moss 2014). I object, however, that each symbolic form is shaped subjectively, in the sense that it results from a balance between an act of creativity and expression and the degree of objectification inherent in the cultural product thus created. A general account of this mechanism can be found in Cassirer (1930).

²⁰ In these cases as well, I will provide direct English translations of the excerpts.

The circle thus closes. Cassirer invokes *Das Reich der Schatten* (The realm of shadows) to illustrate that what we call “form” is the product of an idea that transforms “raw matter” into “pure image”. Human existence becomes an aesthetic play: there are no external things to be passively reproduced in thought; rather, thought actively moulds reality, and this constitutes “the true realm of life”. For Cassirer, relativity represents the highest expression of this transfiguration within physics, thereby explaining the reference to Schiller’s poem in the 1921 work.²¹

4. *Freedom and Necessity: Schiller and Quantum Mechanics*

After completing his extensive work on the philosophy of culture – within which the philosophy of science was integrated – Cassirer returned to epistemology with his study of quantum mechanics, *Determinismus und Indeterminismus. Historische und systematische Studien zum Kausalproblem* (*Determinism and Indeterminism in Modern physics; Historical and Systematic Studies of the Problem of Causality*), published in Sweden in 1937. Schiller appears in this work on two occasions. First, Cassirer once again cites the motto from *Xenien* concerning the relationship between natural scientists and transcendental philosophers, cautioning readers that it might still be premature to attempt a definitive interpretation of quantum mechanics, a theory then in the process of development. Nevertheless, he affirms that it is a fundamental task of philosophy to transcend the rigid boundaries of the sciences and to reflect on their principles and the meaning of their theories. Second, Cassirer appeals to Schiller to defend the critical separation of freedom and necessity and to argue that free will constitutes the independent source of moral law. Indeed, Cassirer warns against the misleading anthropomorphism of statements such as “an electron decides to jump from one orbit to another”, which cannot be meaningfully compared to the deliberation of a human agent before or during action (Cassirer 1937, pp. 249–254). The passage from Schiller that Cassirer quotes is taken from the letters *Über die ästhetische Erziehung des Menschen* (*On the Aesthetic Education of Man*):

Die Person also muss ihr eigener Grund sein, denn das Bleibende kann nicht aus der Veränderung fließen; und so hätten wir denn fürs erste die Idee des absoluten, in sich selbst gegründeten Seins, d.i. die *Freiheit*. Der Zustand muss einen Grund haben; er muss, da er nicht durch die Person, also nicht absolut ist, *erfolgen*, und so hätten wir fürs zweite die Bedingung alles abhängigen Seins oder Werdens, die *Zeit* (cited in Cassirer 1937, pp. 245–246; *SA*, XII, p. 39).²²

²¹ In the course, Cassirer (1920/21a, p. 61) also cites Duhem’s well-known statement (Duhem 1906, p. 274) that “the facts of experience” are presented by physics “in a symbolic form”.

²² “Person, then, must be its own ground, since the permanent cannot result from the changeable; and thus we should have, firstly, the idea of the absolute, self-founded Me, that is, *freedom*. Condition must have a ground; and since it depends not upon person, consequently is not absolute, it must *result* (from something); and so we should have, secondly, the conditional state of all dependent Me, or becoming, that is, *time*” (En. tr. p. 49).

The essential point is that quantum mechanics does not permit us to rely on the ordinary ontological framework of physical reality, according to which particles behave as stable objects whose identity is fixed in both perception and language. On the contrary, we can speak only of the "omnipresence" of waves (Cassirer 1937, pp. 217, p. 228) and define a physical entity in terms of Bohr's complementarity principle and the formalism of the theory.²³ As Cassirer observes, "particularity" is not the starting point for positing the existence of physical objects but rather the outcome of a process.

This ontological indeterminacy, however, disappears when we turn to the domain of moral law, where we encounter true ontological being: the individual as "person". Only on this basis can full responsibility be ascribed to the subject in its free ethical deliberations. Hence, Cassirer's aim was to resist the unwarranted extension of physical indeterminacy into ethics, thereby preserving an anti-reductionist conception of free will. Freedom, he argues, is a form of determination (Cassirer 1937, p. 243) that, while not alien to the principle of causality in physics, remains distinct from it. Before citing Schiller, Cassirer (1937, pp. 244–245) writes:

Every act of "imputation" in the ethical sense always presupposes and is bound to some form of "prediction" (*Vorausberechnung*). An action that entirely fell out of the causal connection, that occurred randomly without cause, would stand completely in a vacuum; it could neither be related to a constant ethical subject nor be imputed to it [...]. The question of "free will" cannot and must not, therefore, be conflated with the question of physical "indeterminism". Free will, whose justification is relevant to ethics, contradicts a dogmatic fatalism; but it by no means contradicts a determinism that has been critically understood and implemented. [...] "Constancy" is not only a physical category; it is at the same time, albeit in an entirely different sense, an ethical category. For all truly moral actions must flow from the unity and constancy of a determined moral "character".

It must be also noted that Cassirer had already refined his interpretation of the principle of causality in quantum mechanics. In brief, he sought to demonstrate that Heisenberg's uncertainty principle does not entail the abandonment of causality and determinism, provided these are understood in a critical sense as expressions of "lawfulness".²⁴

²³ Bohr's complementarity principle consisted in the mutual exclusiveness of the particle- and wave-oriented descriptions of quantum phenomena, coupled with the paradoxical claim that only these two alternatives, taken together, exhaust the "truth" of such phenomena. On this, see Laino (2025).

²⁴ In his famous paper on uncertainty, Heisenberg (1927, p. 197) stated: "In the strict formulation of the causal law, to wit, 'if we can know the present with certainty, we can calculate the future', it is not the apodosis to be false, but rather the protasis (*Voraussetzung*). We cannot know in principle the present in all its determining parts. Thereby every act of perception is a selection of a number of possibilities and a limitation to what is possible in the future". Cassirer argues that even in this case we do not alter the structure of the causal statement, which remains a material conditional, i.e., a proposition of the form "if x , then y ". Indeed, we are merely warned against an overly immediate acceptance of arbitrary values for our variables (Cassirer 1937, p. 150). For example, if we were to

5. Concluding Remarks

This paper has sought to reconstruct Schiller's influence on Cassirer's philosophy of science. The main conclusions can be summarised as follows.

First, the framework of Cassirer's holistic epistemology was developed in *Substance and Function* (1910) as a response to the epistemological debates of his time and his interpretation of Kantian philosophy, which emphasised the spontaneity of the understanding over the passivity of sensory perception. Although this reinterpretation of Kant was influenced by multiple sources, Schiller played a significant role, as evidenced by Cassirer's early references from 1907.²⁵

Second, drawing on passages from *Freiheit und Form* (1916), I have argued that Cassirer's engagement with Schiller aligns with his holistic epistemology. Schiller demonstrated that critical philosophy reveals how experience can be traced back to theory and how theory, in turn, can be applied to experience. Moreover, the recurrence of *Das Reich der Schatten* in both Cassirer's writings on Schiller and in *Zur Einstein'schen Relativitätstheorie* (On Einstein's relativity theory, 1921) suggests a fundamental continuity between epistemology and aesthetic idealism.

Finally, Schiller's thought offered Cassirer a conceptual framework for preserving the autonomy of ethical decision-making against the improper transfer of scientific concepts – such as indeterminacy and uncertainty – into the moral sphere. In this way, free will and moral responsibility remain the foundational pillars of a genuine philosophy of the human being.

engage in a measurement process inconsistent with the limits imposed by the uncertainty principle – attempting to determine both the position and the momentum of a particle simultaneously – the results would be simply absurd (the error in one measurement would approach infinity). Thus, Heisenberg would have confused the rule “*sublato conditionato tollitur conditio*” with the impossible norm “*sublata conditione tollitur conditionatum*” (negation of the antecedent), which would entail nothing less than an inconceivable disruption of the lawfulness of nature. In fact, in such a case not only would a false prediction result, but no prediction would be possible at all, since there would be no reasons to explain phenomena.

²⁵ I have omitted two further references made by Cassirer in the essays *Cohen und die Erneuerung der Kantischen Philosophie* (1912) and *Die Grundproblem der Kantischen Methodik und ihr Verhältnis zur nachkantischen Spekulation* (1914). In the first, Cassirer (1912, pp. 137–138) incorporates the faculty of aesthetic creation into the three directions of consciousness characteristic of Kant's system, which is generally based on “principles of formation” (*Prinzipien der Gestaltung*). In the second, Cassirer (1914, pp. 201–202) mentions Schiller among the post-Kantian thinkers who contributed to forging a unified spirit for Kantian philosophy. Last but not least, more than a hint of Schiller's aesthetic idealism can be found in the category of “will to formation” (*Wille zur Gestaltung*), which appears in Cassirer (1995, p. 27).

Abbreviations

- SA Schillers *Sämtliche Werke. Säkular-Ausgabe in 16 Bänden*, hrsg. von E. von der Hellen, Cotta, Stuttgart-Berlin, 1905. En. tr. by J. Weiss, *The Aesthetic Letters, Essays, and the Philosophical Letters*, Little & Brown, Boston, 1845; En. tr. by E. A. Bowring, *The Poems of Schiller*, Bell, London, 1874.

References to Cassirer's works follow the Meiner edition of his complete and posthumous writings: *Gesammelte Werke* (GW) by Ernst Cassirer, Hamburger Ausgabe, edited by B. Recki, Meiner, Hamburg, 1998–2009, vols. 1–26; and *Nachgelassene Manuskripte und Texte* (NMT), edited by J. M. Krois, Meiner, Hamburg, 1995–2022, vols. 1–19. In the reference list, each volume is cited using the standard author-date format and, where available, accompanied by the corresponding English translation.

References

- Beiser, F. 2005. *Schiller as Philosopher: A Re-Examination*. Oxford University Press, Oxford.
- Beiser, F. 2023. "The Neo-Kantians and Schiller's Transcendental Idealism", in A. Falduto and T. Mehigan (Eds.), *The Palgrave Handbook on the Philosophy of Friedrich Schiller*, Palgrave Macmillan, Cham, pp. 559–571.
- Cassirer, E. 1902. *Leibniz' System in seinen wissenschaftlichen Grundlagen*, GW, Bd. 1, hrsg. von M. Simon, Meiner, Hamburg, 1998.
- Cassirer, E. 1907a. *Das Erkenntnisproblem in der Philosophie und Wissenschaft der neueren Zeit. Zweiter Band*, GW, Bd. 3, hrsg. von D. Vogel, Meiner, Hamburg, 1999.
- Cassirer, E. 1907b. *Kant und die moderne Mathematik*, GW, Bd. 9, hrsg. von M. Simon. Meiner, Hamburg, 2001, pp. 37–82.
- Cassirer, E. 1910. *Substanzbegriff und Funktionsbegriff*, GW, Bd. 6, hrsg. von R. Schmücker; En. tr. by W. C. Swabey, M. C. Swabey, *Substance and Function and Einstein's Theory of Relativity*, Dover, New York, 1953, pp. iii–iv, 1–346.
- Cassirer, E. 1912. *Herman Cohen und die Erneuerung der Kantischen Philosophie*, GW, Bd. 9, pp. 119–138.
- Cassirer, E. 1913. *Erkenntnistheorie nebst den Grenzfragen der Logik*, GW, Bd. 9, pp. 139–200.
- Cassirer, E. 1914. *Die Grundprobleme der Kantischen Methodik und ihr Verhältnis zur nachkantischen Spekulation*, GW, Bd. 9, pp. 201–216.
- Cassirer, E. 1916. *Freiheit und Form*, GW, Bd. 7, hrsg. von R. Schmücker, Meiner, Hamburg 2001.
- Cassirer, E. 1920/21a. *Die philosophischen Probleme der Relativitätstheorie*, NMT, Bd. 8, hrsg. von J. Fingerhut, G. Hartung, R. Kramme, Meiner, Hamburg, 2010, pp. 29–115.
- Cassirer, E. 1920/21b. *Schillers philosophische Weltansicht*, NMT, Bd. 12, hrsg. von G. Hartung, Meiner, Hamburg, 2015.
- Cassirer, E. 1921. *Zur Einstein'schen Relativitätstheorie. Erkenntnistheoretische Betrachtungen*, GW, Bd. 10, hrsg. von R. Schmücker, Meiner, Hamburg 2001; En. tr. by W. C. Swabey, M. C. Swabey, *Substance and Function and Einstein's Theory of Relativity*, Dover, New York, 1953, pp. 347–460.

- Cassirer, E. 1921/24. *Idee und Gestalt*, GW, Bd. 9, pp. 243–435.
- Cassirer, E. 1929. *Philosophie der symbolischen Formen. Dritter Teil: Phänomenologie der Erkenntnis* 1929, GW, Bd. 13, hrsg. von J. Clemens, Meiner, Hamburg 2002; En. tr. by R. Manheim, *Philosophy of Symbolic Forms. Volume Three: Phenomenology of Knowledge*, Yale University Press, New Haven-London, 1957.
- Cassirer, E. 1930. *Form und Technik*, GW, Bd. 17, hrsg. von T. Berben, Meiner, Hamburg 2004, pp. 139–183.
- Cassirer, E. 1937. *Determinismus und Indeterminismus in der modernen Physik. Historische und systematische Studien zum Kausalproblem*, GW, Bd. 19, hrsg. von C. Rosenkranz, Meiner, Hamburg, 2004.
- Cassirer, E. 1995. *Zur Metaphysik der symbolischen Formen*, NMT, Bd. 1, hrsg. von J. M. Krois, Meiner, Hamburg.
- Cassirer, E. 2009. *Ausgewählter wissenschaftlicher Briefwechsel*, NMT, Bd. 18, hrsg. von J. M. Krois, Meiner, Hamburg.
- Cohen, H. 1883. *Das Prinzip der Infinitesimal-Methode und seine Geschichte*. Dümmler, Berlin.
- Eddington, A. S. 1920. *Space, Time, and Gravitation: An Outline of the General Relativity Theory*, Cambridge University Press, Cambridge.
- Heisenberg, W. 1927. “Über den anschaulichen Inhalt der Quantentheoretischen Kinematik und Mechanik”, *Zeitschrift für Physik*, 43, pp. 172–198.
- Heisenberg, W. 1971. *Physics and Beyond: Encounters and Conversations*, En. tr. by A. J. Pomerans, Harper & Row, New York.
- Hentschel, K. 1990. *Interpretationen und Fehlinterpretationen der speziellen und der allgemeinen Relativitätstheorie durch Zeitgenossen Albert Einsteins*, Birkhäuser, Basel.
- Hume, D. 1739. *A Treatise of Human Nature*, Penguin, London, 1969.
- Ihmig, K.-N. 2001. *Grundzüge einer Philosophie der Wissenschaften bei Ernst Cassirer*, WBG, Darmstadt.
- Kant, I. 1755/2012. *Universal Natural History and Theory of the Heavens*, En. tr. by O. Reinhardt, in E. Watkins (Ed.), *Natural Science*, Cambridge University Press, Cambridge, pp. 182–308.
- Laino, L. 2025. “Dialectics of Nature: The Reception of Quantum Mechanics in Tanabe and Cassirer”, in R. Lupacchini (Ed.), *Tetsugaku Companion to Modern Physics and Kyoto School Philosophy*, Springer, Cham. Forthcoming.
- Minkowski, H. 1909. “Raum und Zeit”, *Jahresbericht der Deutschen Mathematiker-Vereinigung*, 18, pp. 75–88; En. tr. *Space and Time: Minkowski's Papers on Relativity*, Minkowski Institute Press, Montreal, 2012.
- Moss, G. 2015. *Ernst Cassirer and the Autonomy of Language*, Lexington Books, Lanham-London.
- Poincaré, J. H. 1902. *Science and Hypothesis*, En. tr. by W. J. Greenstreet, Walter Scott, London.
- Quine, W. V. O. 1980. *From a Logical Point of View*, Harvard University Press, Cambridge-London.
- Richardson, A. 2015. “Holism and the Constitution of ‘Experience in its Entirety’: Cassirer contra Quine on the Lessons of Duhem”, in J. T. Friedman and S. Luft (Eds.), *The Philosophy of Ernst Cassirer: A Novel Assessment*, De Gruyter, Berlin-Boston, pp. 103–121.
- Russell, B. 1914. *Our Knowledge of the External World*, Routledge, Oxford-New York, repr. 2009.

- Russell, B. 1951. *The Principles of Mathematics*, Allen & Unwin, London, repr. 1937.
- Ryckman, T. 1999. "Einstein, Cassirer, and General Covariance. Then and Now", *Science in Context*, 124, pp. 585-619.
- Ryckman, T. 2005. *The Reign of Relativity: Philosophy in Physics 1915-1925*, Oxford University Press, Oxford.
- Schlick, M. 1918. *Allgemeine Erkenntnislehre*, Springer, Berlin.
- Schlick, M. 1921. "Kritizistische oder empiristische Deutung der neuen Physik? Bemerkungen zu Ernst Cassirers Buch *Zur Einstein'schen Relativitätstheorie*", in F. O. Engler (Ed.), *Texte zu Einsteins Relativitätstheorie*, Meiner, Hamburg, 2019, pp. 125-143.
- Schlick, M. 1932. *Form and Content: An Introduction to Philosophical Thinking*, in *Gesammelte Aufsätze*, Gerold, Wien, 1938, pp. 151-249.
- Skidelsky, E. 2008. *Ernst Cassirer: The Last Philosopher of Culture*, Princeton University Press, Princeton-Oxford.
- Vaihinger, H. 1911. *Die Philosophie des Als Ob: System der theoretischen, praktischen und religiösen Fiktionen der Menschheit auf Grund eines idealistischen Positivismus. Mit einem Anhang über Kant und Nietzsche*, Reuter & Richard, Berlin.
- Van Fraassen, B. 2008. *Scientific Representation: Paradoxes and Perspectives*, Oxford University Press, Oxford-New York.

