·科学技术文化研究·

在科学与人文之间的恩斯特·卡西尔

Ernst Cassirer Between Science and the Humanities

迈克尔·弗里德曼 /Michael Friedman

（斯坦福大学哲学系，加利福利亚，94305）
(Department of Philosophy, Stanford University, California, 94305)

摘　要：恩斯特·卡西尔（1874−1945）是一位研究康德的重要学者，他或许是其导师赫尔曼·柯亨开创的导源于马堡的新康德传统中最重要的哲学家。卡西尔还创作了他自己的原创哲学，符号形式的哲学，该哲学远远超越了新康德主义现存的一切版本，也正是这种哲学随后在更广泛的人文科学中产生了最大的影响。尽管如此，在他的职业生涯中，卡西尔对我们理解与数学和物理学有关的精密科学以及那些被我们如今归于人文科学的学科（思想史、艺术史、文化史、宗教研究与哲学本身），都做出了同等重要的贡献。在康德之后，没有其他哲学家能像卡西尔一样如此深刻地置身于精密科学与人文科学之中，并借此取得了一种独一无二的地位来阐明两者之间的关系。卡西尔在其1942年的论著《人文科学的逻辑》中最为明确地论述了这种关系。我将勾勒一条从康德到黑格尔，再到马堡学派与卡西尔的那段哲学史中某些最重要的问题的路径，从而在该语境下理解卡西尔的论述。

关键词：新康德主义　精密科学　人文科学　符号形式　文化史

Abstract: Ernst Cassirer (1874-1945) was an important Kant scholar and perhaps the leading philosopher in the neo-Kantian tradition originating in Marburg with his teacher Hermann Cohen. Cassirer also produced an original philosophy of his own, the philosophy of symbolic forms, going well beyond all extant versions of neo-Kantianism, and it was this philosophy that was most influential subsequently within the humanities more generally. In the course of his career, however, Cassirer made equally important contributions to our understanding of both the exact sciences of mathematics and physics, and the disciplines we now classify among the humanities: intellectual history, art history, cultural history, religious studies, and philosophy itself. No other philosopher after Kant was so deeply situated within both the exact sciences and the humanities, and was thereby in a unique position to illuminate the relationship between them. Cassirer's 1942 book, *The Logic of the Humanities*, was his most explicit treatment of this relationship. I shall contextualize Cassirer's treatment by sketching a route through some of the most important issues in the history of philosophy from Kant through Hegel and then to the Marburg School and Cassirer.

Key Words: Neo-Kantianism; Exact sciences; Humanities; Symbolic forms; Cultural history

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Ernst Cassirer was one of the most remarkable intellectuals of the twentieth century. He was an important Kant scholar and perhaps the leading philosopher in the neo-Kantian tradition originating in Marburg with his teacher Hermann Cohen. But he alsoproduced an original philosophy of his own, the philosophy of symbolic forms, goingwell

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作者简介：迈克尔·弗里德曼（1947–），斯坦福大学苏佩斯科学哲学讲席教授。他的研究兴趣包括康德、科学哲学与20世纪哲学史。Email: mlfriedman@stanford.edu

Michael Friedman(1947-) is Suppes Professor of Philosophy of Science at Stanford University. His research interests include Kant, Philosophy of Science, History of Twentieth Century Philosophy. Email: mlfriedman@stanford.edu

beyond all extant versions of neo-Kantianism. It was this philosophy that was mostinfluential subsequently within the humanities more generally, especially in art history and, more recently, cultural studies. My own work centers around Kant scholarship, together with the history and philosophy of science after Kant. What is most remarkable to me is the way in which Cassirer made equally important contributions to our understanding of both the exact sciences of mathematics and physics, and the disciplines we now classify among the humanities: intellectual history, art history, cultural history, religious studies, and, of course, philosophy itself. I can think of no philosopher after Kant who was so deeply situated in both the exact sciences and the humanities, and was thereby in a uniqueposition to illuminate the relationship between them. In particular, Cassirer, more than any other thinker of the time, was able successfully to negotiate the fraught relationship between the *Naturwissenschaften* and *Geisteswissenschaften* that had been with us since the late nineteenth century.

In his 1942 book on this topic Cassirer did not use the term "*Geisteswissenschaften*"(often translated as "humanities"), but instead used the term "*Kulturwissensch aften*"("cultural sciences"). Nevertheless, the first English translation (1961) chose *The Logicof the Humanities* as its title—while the newer translation (2000), by contrast, correctly has *The Logic of the Cultural Sciences*. But does this issue of translation really matter? I shall approach the question by briefly sketching a route through some of the deepest and most difficult issues in the history of philosophy from Kant through Hegel, and then to the Marburg School and Cassirer. I shall have to pass over many of the difficult details. But I hope to be clear and illuminating nonetheless.

Kant on the Possibility and Limits of Scientific Knowledge

At the center of Kant's philosophy is a sharp dichotomy between two different sources of human knowledge: our passive or receptive faculty of sensibility, through which we receive sensory impressions, and our active or spontaneous faculty of understanding, through which we think concepts and make judgements. Both of these faculties involve a distinction between a priori form and a posteriori content. There are two forms of sensibility, space and time, and twelve logical forms of judgement (universal, particular, singular; categorical, hypothetical, disjunctive; and so on), which give rise to twelve pure categories of the understanding (unity, plurality, totality; substance, causality, community; and so on). The a posteriori content that is then placed within these forms consists of sensations or sense impressions, on the sensible side, andempirical concepts (such as *color*, *hardness*, *impenetrability*, and so on), on the intellectual side. Human knowledge, for Kant, involves both concepts and intuitions, and thus anecessary cooperation between understanding and sensibility. Since the two areoriginally distinct, however, Kant sets out to show, in the Transcendental Deduction of the Categories in the *Critique of Pure Reason*, that everything that can be given to our sensibility in space and time is necessarily subject to the pure categories of theunderstanding. Such an argument is needed because Kant holds that we can consistently *think* supersensible objects—such as God and the soul—independently of space and time, although we can only *know* objects (at least from a theoretical point of view) that are given to us in space and time. And this negative demonstration of the limits of ourknowledge also has a crucially important positive benefit. It makes room for an essentially different use of our reason, the moral or practical use:

> Thus I had to deny *knowledge* [*Wissen*] in order to make room for *faith* [*Glauben*], and the dogmatism of metaphysics—that is, the prejudice that reason can make progress in it without critique—is the true source of all unbelief [*Unglauben*] conflicting with morality,which [unbelief] is always very dogmatic. (Bxxx)①

Kant's immediately preceding remarks make it clear that it is *moral* or *practical* faith that first gives objective reality (from a practical point of view) to the three Ideas of Pure (Practical) Reason—God, Freedom, and Immortality:

> Thus, I could not even *assume* [*annehmen*] God, Freedom, and Immortality on behalf of the necessary practical use of my reason if I did not simultaneously *deprive* [*benehmen*] speculative reason of its claim to extravagant insights—because, in order to attain these it must make use of principles which, in so far as they in fact reach merely to objects of possible experience,

① I cite the *Critique of Pure Reason* by page numbers of the first ('A') edition (1781) and second ('B') edition (1787) respectively. The quoted passage is from the second edition Preface. All other Kantian works are cited by volume and page number of the Akademie edition ('Ak.') of Kant's gesammelte Schriften(1900-). All translations from the German are my own.

> are such that, if they are nevertheless applied to what cannot be an object of experience, actually transform it into appearance and therefore declare all practical extension of pure reason to be impossible. (Bxxix-xxx)

It is precisely by denying the possibility of theoretical (scientific) knowledge of such supersensible objects that Kant is able to make room for practical faith in them.

But how do we establish the possibility of theoretical (scientific) knowledge in the first place, and what kind of knowledge does Kant have primarily in mind? Kant's most-fundamental explanation of this possibility occurs in the notoriously difficult §26 of the second edition Transcendental Deduction. Kant begins with the fact, established earlier in the Transcendental Aesthetic, that space and time are our two *forms* of sensible intuition. The crux of the argument follows:

> But space and time are represented a priori, not merely as formsofsensible intuition, but as *intuitions* themselves (which contain amanifold) and thus with the determination of the *unity* of this manifold(see the Transcendental Aesthetic*). Therefore, *unity of the synthesis* of the manifold, outside us or in us, and thus a *combination* with which everything that is to be represented in space or time as determined must accord, is itself already given simultaneously, with (not in) theseintuitions. But this synthetic unity can be no other than that of the combination of the manifold of a given *intuition in general* in an original consciousness, in accordance with the categories, only applied to our *sensible intuition*. Consequently all synthesis, even that whereby perception becomes possible, stands under the categories, and, since experience is knowledge through connected perceptions, the categories are conditions of the possibility of experience, and thus area priori valid for all objects of experience. (B160-161)

The reference back to the Transcendental Aesthetic in the first sentence has led to considerable controversy ever since, and I shall return to some of this controversy below(in connection with both Hegel and the Marburg neo-Kantians). I shall now simply observe that the structure of the argument, at least, is relatively simple. Space and timeare not merely forms of intuition, through which all perception of empirical objects (appearances) takes place, they are also unified and unitary objects themselves. But all such synthetic unity must, according to the earlier part of the Deduction, be due to the understanding and proceed in accordance with the categories. Therefore, everything that is given to us in space and time is also subject to the understanding and thus to its pure categories.

What kind of knowledge of objects of intuition is thereby made possible? The footnote to the Transcendental Aesthetic appended to the first sentence gives as example the science of geometry:

> *Space represented as *object* (as is actually required in geometry)contains more than the mere form of intuition—namely, [it contains]the *grasping together*[*Zusammenfassung*] of the manifold, given in accordance with the form of sensibility, in an *intuitive* representation, so that the *form of intuition* gives merely a manifold, but the *formalintuition*[also] gives unity of representation. In the Aesthetic I counted this unity [as belonging] to sensibility, only in order to remark that it precedes all concepts, although it in fact presupposes a synthesis that does not belong to the senses but through which all concepts of space and time first become possible. For, since through it (in that the understanding determines sensibility) space or time are first *given* as intuitions, the unity of this a priori intuition belongs to space and time, and not to the concept of the understanding (§24). (B160-161n)

Again, this footnote has also given rise to intense controversy, which still continues today.[①] I shall here simply assert that the geometry Kant has in mind is that of Euclid's Elements, which proceeds by constructing its objects (spatial figures) successively. According to Euclid's second Postulate, for example, we can extend any given (finite) line segment indefinitely in both directions. But this kind of possibility of construction, according to Kant, presupposes that the space in which such indefinite extension it to takeplace is already given as a single unified whole. The synthetic unity of space as a whole, however, presupposes a synthesis of the understanding in accordance with the transcendental unity of apperception (the '*I think*'), and thus brings with it the possibility of applying the categories (here, in particular, the categories of quantity) to anything presented to us anywhere in space. More generally, all mathematical synthesis similarly involves the categories of quantity (unity, plurality, and totality), which are thus always applicable to objects (including empirical objects) presented

① For my own perspective on this controversy see Friedman (forthcoming), together with the references cited there.

in space.

Kant is speaking here, however, not only of space, but of *space and time*. What happens when we consider both forms of intuition, and what further knowledge of spatio temporal (empirical) objects is thereby made possible? Once again we are faced within tense controversy, and I shall again simply assert that the additional scientific knowledge in question is the modern mathematical theory of motion first systematically articulated in Newton's *Mathematical Principles of Natural Philosophy*(1687). Important clues in this direction can be gleaned from the reference back to §24 in the footnote, and, even more, from the Transcendental Exposition of the Concept of Time added to the Aesthetic in the second edition:

> Here I may add that the concept of alteration and, along with it, the concept of motion (as alteration of place) is possible only in and through the representation of time: so that, if this representation were not an a priori (inner) intuition, no concept, whatever it might be, could make an alteration—i.e., the combination of contradictorily opposed predicates (e.g., the being and not-being of one and the same thing at one and the same place)—conceivable. Only in time can two contradictorily opposed determinations in one thing be met with, namely, *successively*. Therefore, our concept of time explains as much synthetic a priori knowledge as is set forth in the general doctrine of motion, which is by no means unfruitful. (B48-49)

The case can then be clinched, in my view, by attending to the *Metaphysical Foundationsof Natural Science*, appearing in 1786 between the first (1781) and second (1787) editions of the *Critique of Pure Reason*. There, as I have argued in detail elsewhere, we see Kant intensively concerned with the foundations of Newtonian physics—including the status of what Kant calls the three Laws of Mechanics (the conservation of the total quantity of matter, the law of inertia, and the equality of action and reaction).① These Laws are supposed to be realizations, relative to the empirical concept of matter (movable, impenetrable, and mechanically interacting corporeal substances in space), of the three relational categories of substance, causality, and community. And it is here that all *dynamical* synthesis—involving both space and time—is extended beyond the merely mathematical synthesis exhibited in the science of geometry. All objects presented to us in both space and time are subject to both mathematical and dynamical synthesis, and it is in precisely this way that empirical scientific knowledge of nature (what Kant calls "experience") first becomes possible.②

As Kant explains in the *Metaphysical Foundations*, a *special* metaphysics of nature,based on a particular empirical realization of the categories and principles of *general* metaphysics (the transcendental philosophy of the *Critique of Pure Reason*), is only possible in virtue of the application of mathematics to empirically given objects—here to matter or bodies. The result is a mathematically precise empirical realization of the relational categories: the category of substance by the quantitatively precise (Newtonian) concept of quantity of matter, causality by the precise (Newtonian) concept of impressed force, community by the precise (Newtonian) concept of interaction. Kant holds that we have full insight into the necessity of empirical causal laws (such as the Newtonian lawof universal gravitation) only in virtue of such mathematical realizations of the more *general* concepts (belonging to general metaphysics) of substance, causality, and community. And, Kant argues, since this is only possible in the case of objects of *outer* sense in space, the science of body is what he calls a *proper* natural science, but there is no such science of the soul.③

Kant's conception of proper natural science has important implications concerning the limits of our scientific knowledge—including, in particular, limits that occur within the phenomenal world of appearances in space and time. These additional limitations are explained in the account of reflective judgement developed in the *Critique of the Powerof Judgement* (1790), in the discussion of the Antinomy of the Power of Judgement presented towards the end of this (third) *Critique*. Here we are faced with a conflict between two (regulative) maxims of reflective judgement (Ak. 5, 387): one according to which "[a]ll generation of material things and their forms must be judged

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①See Friedman (2013). I argue there, in particular, that what Kant calls the "general doctrine of motion [*allgemeine Bewegungslehre*]" in the above passage from the Aesthetic (B48-49) is closely linked to what he calls the "mathematical doctrine of motion [*mathematische Bewegungslehre*]" in the *Metaphysical Foundations*—which aims, in turn, to be a metaphysical foundations for Newton's *mathematical* principles of natural philosophy.

②The transition from mathematical to dynamical synthesis—together with Kant's technical notion of "experience [*Erfahrung*]"—is discussed in Friedman (2013). See also Friedman (2012) for more relevant details.

③See the Preface to the *Metaphysical Foundations*(Ak. 4, 471). This argument is discussed in detail in Friedman (2013).

as possible in accordance with merely mechanical laws," the other according to which "[s]ome products of material nature cannot be judged as possible according to merely mechanical laws (judging them requires an entirely different law of causality, namely that of final causes)." In the following discussion of this Antinomy it then becomes clear that what Kant calls mechanism is essentially framed by the three Laws of Mechanics. To have full insight into causal necessity, for Kant, means to have explained the necessity in question in terms of "moving forces" governed by these Laws—that is, to have explained it viaproper natural science in the sense of the Metaphysical Foundations.①

Kant's solution to the Antinomy involves, in the first place, the idea that both maxims are merely *regulative* principles: we shall never be able actually to arrive at mechanical explanations for all of the phenomena of nature, and so we must at somepoint resort to teleology. But, in the second place, teleology, unlike mechanism, is a merely subjective principle of the faculty of judgement, intended to guide our search for genuinely *constitutive* mechanical explanations as far as it might go. To ascribe such a purpose (for example to the eye) is merely to express our present (and perhaps perpetual) ignorance of an object's true internal causal structure, while at the same guiding us fruitfully in our ongoing search for underlying mechanisms (which explain the eye's ability to focus, for example, in terms of the reflection and refraction of light). And finally, since our capacity to arrive at mechanical explanations is necessarily limited, so that teleology, at some point, is always needed as a guide, it follows, for Kant, that the need for teleology will always be felt within the organic realm, and, even more, when we arrive at the realm of human life and culture. In particular, when it comes to the study of human history, as Kant suggests in his *Idea for a Universal History with a Cosmopolitan Purpose* (1784), it turns out that historical inquiry must be guided by a moral and political ideal (in this case that of a world government) in order to become a coherent and systematic intellectual project. It is precisely here that Kant's attempt to strike a balance between a very strict—and therefore limited—conception of genuine or proper natural science, on the one side, and a very expansive—and thus overriding—conception of pure practical reason, on the other, is supposed to bear its intended fruit.

Hegel on Nature and Spirit

I shall focus on two early monographs from Hegel's Jena period, when he was most under the influence of Schelling: *The Difference between Fichte's and Schelling's Systems of Philosophy* (1801) and *Faith and Knowledge, or the Reflective Philosophy of Subjectivity in the Completion of all its Forms as Kantian, Jacobian and Fichtean Philosophy* (1802). Yet they are not unrepresentative of (although of course considerably less developed than) his mature philosophical conception.② What is most important, for our purposes, is that both Schelling and Hegel were concerned with extending the approach to the philosophy of natural science that Kant had initiated into an organic conception of nature as a whole. The basic idea is that, although we begin, like Kant,with the "dead" (lifeless) matter considered in mechanics, we regard this as only the first step in an extended process of organic development. We begin, as Kant did, by constructing matter dynamically in terms of the fundamental force of impenetrability or repulsion, the counteracting fundamental force of attraction, and the balance of the two in a stable equilibrium. Unlike in Kant, however, our ambition is to comprehend all of the forces of nature by an indefinite extension of the same dialectical procedure. Thus, we next arrive at the fundamental forces of electricity and magnetism (positive, negative, and current electricity), then at chemical or galvanic forces (in electrolysis, for example), then at the biological forces of excitation and sensitivity (resting on the electro-chemicalactivity of nervous and muscular tissue), and so on. We hope thereby eventually to arrive at specifically human life and thus at mind or spirit (*Geist*). All of nature, in this sense, is ultimately alive; mechanism and teleology are united; nature and spirit are one.

This new conception of nature is the key element in the *Naturphilosophie* initiatedby Schelling and continued by Hegel, and, although it may appear fanciful today,

① Kant's discussion of "mechanism," "*moving forces*," and the Laws of Mechanics (in particular the law of inertia) extends throughout the discussion following the statement of the Antinomy. It culminates in §77 with Kant's famous contrast between the standpoint of our finite human understanding and that of the infinite divine understanding. The crucial point is that, "[i]n accordance with the constitution of our understanding, by contrast [to an infinite divine understanding], a real whole of nature is to be regarded only as the effect of the concurrent moving forces of the parts" (Ak. 5, 407; emphasis added).

② Hegel and Schelling worked together in Jena between 1801 and Schelling's departure in 1803. Between 1803 and 1806 Hegel remained in Jena working on what is now considered to be his first philosophical masterpiece, the *Phenomenology of Spirit*, which appeared in 1807.

there are several points worth emphasizing nonetheless. ① First, *Naturphilosophie* was a coherent response to some of the cutting-edge developments in turn of the century physical science: the invention of the battery or galvanic pile, together with the consequent investigations of current electricity (including the discovery of electromagnetism by Hans Christian Oersted), related work at the intersection of chemistry and electricity (what we now call electro-chemistry) stimulated by the discovery of electrolysis, the discovery of the electrical character of nervous transmission, and so on.Second, it also represented a coherent and insightful response to perceived problems with the Kantian system. It provided a more optimistic view of how the basically Newtonian physical science grounded in the *Metaphysical Foundations* could be extended to the large number of natural phenomena—in chemistry, electricity, the theory of heat, and biology—left unaccounted for by Newtonian science. The apparent skepticism concerning the possibility of objective knowledge of these phenomena arising on Kant's restricted (Newtonian) view of proper natural science could thereby now be overcome.

In the *Critique of the Power of Judgement* Kant completed what he understood as his system of nature and freedom by adding to the sharp distinction between theoretical and practical reason already emphasized in the *Critique of Practical Reason* (1788) a new distinction between genuinely constitutive (objective) principles of the understanding and merely regulative (subjective) principles of reflective judgement. Mechanical explanations in the sense of the *Metaphysical Foundations* (when attainable) are constitutive and objective; teleological explanations—although still always necessary for creatures with finite discursive understandings like ours—are nevertheless merely regulative and subjective. Kant thereby achieved a kind of balance between nature and (moral) freedom, between the sensible phenomenal realm and the super-sensible noumenal realm—wherein the ideas of *Pure Practical Reason* (God, Freedom, Immortality) indeed acquire objective reality but only from a purely practical point of view. The *Naturphilosophie* of Schelling and Hegel, by contrast, aimed to achieve a kind of *identity*, as opposed to a Kantian balance, between nature and the human realm of consciousness, culture, and freedom. This was to be achieved by positing an infinitedivine reason—Absolute Reason—which manifests itself as *both* nature *and* spirit in a temporally extended dialectical process of organic development. ②

I shall illustrate these ideas by a few key passages from Hegel's Jena writings. Thus, to begin with the first monograph on Fichte and Schelling, Hegel criticizes Kant's *Metaphysical Foundations* for appealing to an inadequate notion of force (*Kraft*):

> [In Kant's] natural science, on the one hand and in general, insight into the possibility of fundamental forces is something impossible, and, on the other hand, such a natural science, for which nature is a matter, i.e., something absolutely opposed [to Reason], something not self determining, can only construct a mechanics. [Even] with the poverty of attractive and repulsive forces, it has already made matter too rich; for force is something internal, which produces something external, something self-positing = *I*, and such a thing, from a purely idealistic standpoint, cannot pertain to matter. [Kant] conceives matter merely as objective, that which is opposed to the I; these forces are for himnot only superfluous, but either purely ideal, in which case there are no forces, or transcendent. There remains for him no dynamical but only a mathematical construction of appearances. (Hegel 1968, 69-70)

Hegel is considering two philosophical sciences, *Naturphilosophie* and *Transzendental Philosophie*, and he has now argued that Kant's conception of the former is inadequate.

A few pages later Hegel draws the consequence that Kant's transcendental philosophy, more generally, has an inadequate conception of the realms of nature and freedom, and thus of the relationship between the theoretical and the practical:

> Nature, moreover, has freedom, for it is not a static [*ruhendes*] being, but at the same time a becoming, a being that is not divided and synthesized from outside, but rather separates and unites itself in itself, and does not posit itself as something merely limited, but rather posits itself freely as the whole. Its

① This perspective on *Naturphilosophie*is developed in Friedman (2006) (2007).

② Thus, the relation between spirit and nature envisioned by Schelling and Hegel is analogous to the relation between God and nature earlier developed by Spinoza—where, for Spinoza, they represent two different aspects or manifestations of the same infinite substance. The main difference, however, is that Schelling and Hegel, in sharp contrast to Spinoza, place overriding importance on *teleological development*(and therefore also on *freedom*).

> unconscious development is a reflectionof living force [*lebendigen Kraft*], which divides itself endlessly, but in every limited form it posits itself and is identical; and, in so far as it is limited to no [single] form of nature, it is free. — If, therefore, the science of nature as such is the theoretical part of philosophy, the science of intelligence [*Intelligenz*] the practical part,then each of these, in turn, has at the same time its own theoretical and practical part for itself. (Hegel 1968, 73)

Since *Naturphilosophie* and *Transzendental-Philosophie* are simply two different standpoints for considering the same Absolute Reason, both are manifestations equally of necessity (in their progressive conceptual development) and of freedom (in the inexhaustibly expanding variety of the thereby resulting forms).

In the second monograph, *Faith and Knowledge*, Hegel presses the argument further by going deeper into his fundamental disagreements with Kant. He focuses from the beginning on Kant's original dichotomy between two initially opposed faculties of the mind, sensibility and understanding, and he focuses, appropriately, on §26 of the B Deduction:

> One glimpses this idea ["the identity of such in homogeneities"] through the surface of the Deduction of the Categories, and, in relation to space and time, not there, where it should be, in the Transcendental Exposition of these forms, but in what follows, where the original synthetic unity of apperception first comes to the fore and also becomes known as principle of figurative synthesis or the forms of intuition, and space and time themselves [become known] as synthetic unities, and the productive imagination, spontaneity, and absolute synthetic activity are conceived as principles of sensibility, which had been previously characterized only as receptivity. This original synthetic unity must not be conceived as the product of opposed[factors], but as a truly necessary, absolute, original unity . . . One and the same synthetic unity—and what this means here has just been determined—is the principle of intuition and the understanding. (Hegel 1968, 327)

For Hegel, therefore, sensibility and understanding must have a "common root," in the terminology later made infamous by Heidegger (1929)—although for Hegel the common root is Absolute Reason and certainly not our finite human imagination as it is for Heidegger. But there is no doubt, in any case, that the Hegelian criticism focused on §26 of the Deduction has had an enduring philosophical legacy. Indeed, the preponderance of post-Kantian German philosophers after Hegel embraced it in one form or another, including, as we shall soon see, the Marburg neo-Kantians.

Before I turn to Cassirer and the Marburg School, however, it is important to see that Hegel also focuses his criticism on §77 of *Critique of the Power of Judgement*—where, as I have indicated, Kant argues for the limits of mechanism by invoking acontrast between our finite understanding and an infinite divine understanding (see note 6 above). It is because of this "peculiarity" of *our* understanding, for Kant, that we must proceed mechanically from the parts to the whole and cannot grasp the whole all at once—and it is for the same reason that the infinite divine intellect is simply beyond our comprehension. Hegel responds by stating that, although Kant does recognize that the idea of a real unity of mechanism and teleology is possible in principle, he nevertheless refuses to take up the higher standpoint of Absolute Reason (divine Reason) in which all such dichotomies are overcome:

> [Kant] recognizes that, *in and for itself*, it may be possible that the mechanism of nature, the causal relation, and its teleological technicism are one. . . Although Kant recognizes this as not impossible, and thus as one form of thinking, he still remains with that way of thinking on which [nature] is simply divided, and what knows it is a correspondingly contingent, simply finite and subjective cognitive faculty, which he calls the human cognitive faculty, and declares the rational cognition for which organism, as [truly] real Reason, is the higher principle of nature and the identity of the universal and the particular, to be transcendent. (Hegel 1968, 341-342)

Hegel then draws the further conclusion that Kant's denial of (theoretical) knowledge to make room for (practical) faith can be similarly overcome from the same standpoint:

> If we take away from the practical faith of the Kantian philosophy(namely faith in God,—for the Kantian presentation of the practical faith in immortality lacks all originality that would make it worthy of philosophical attention) some of the unphilosophical and popular trappings with which it is decked, then there is nothing else expressed in it but the idea

> that Reason at the same time has Absolute Reality, that in this idea all opposition between freedom and necessity is overcome, that infinite thought is at the same time Absolute Reality, or the absolute identity of thinking and being. (Hegel 1968, 344-345)

Especially here, I think, Hegel displays penetrating insight indeed into the connections among the B Deduction, with its emphasis on the Euclidean-Newtonian mathematical description of nature, the *Metaphysical Foundations*, with its (Newtonian) mathematical conception of moving forces, and the Antinomy of the Power of Judgement, which there by gives a precise sense to the idea of denying (theoretical) scientific knowledge to make room for (practical) faith. It is precisely here that Hegel's conception of *philosophical* scientific knowledge diverges most fundamentally from Kant's Euclidean-Newtonian conception of *proper* (i.e., *mathematical*) scientific knowledge.

Cassirer from Marburg to the Cultural Sciences

Cassirer studied at the University of Marburg under Hermann Cohen from 1896 to1899, when he completed his doctoral work with a dissertation on Descartes's analysis of mathematical and natural scientific knowledge. This then appeared as the Introduction to Cassirer's first published work (1902), a treatment of Leibniz's philosophy and its scientific basis. Cassirer developed these themes further while working out his monumental interpretation of the development of modern philosophy and science from the Renaissance through Kant in the first two volumes of *The Problem of Knowledge in the Philosophy and Science of the Modern Age*(1906, 1907). And a similar integration of developments in the history of modern science and philosophy, still in the tradition of Marburg neo-Kantianism, continued in Cassirer's next book, *Substance and Function* (1910).

Although neo-Kantianism, in general, aimed to return to Kantian Erkenntniskritikasan antidote to what was viewed as the metaphysical extravagances of post-Kantian German idealism, the Marburg School, in particular, retained important elements of the Hegelian legacy. For example, Cohen begins from the same passage in the B Deductionas had Hegel—the passage quoted above (B160-161) where Kant says that space and time are not merely "*forms* of intuition" but also "*intuitions* themselves." And here Cohen, like Hegel, seeks to replace the original Kantian conception of sensibility and understanding as two fundamentally distinct faculties of the mind with an original unity ultimately grounded in the intellect:

> But through this equation [between "*forms* of intuition" and "*intuitions* themselves"] we guard against the suspicion that a form that "lies *ready*" could be a "*completed*" form. Intuition, even pure intuition, is generated. It lies "ready" but is not "complete". Such errors are only possible if one treats transcendental aesthetic without transcendental logic, if one severs the unity of the Kantian critique, if one has not made clear to oneself the form of space as contribution and instrument of the highest principle of the transcendental unity of apperception. (Cohen 1885, 156)

For Cohen, therefore, space and time are not merely receptive faculties opposed to the active understanding, but "contributions and instruments" of the understanding itself. Cassirer follows Cohen here in the second volume of *The Problem of Knowledge*(1907,684): "The pure intuitions of space and time, like the concepts of pure understanding, are only different aspects and manifestations [*Entfaltungen und Ausprägungen*] of the basic form of the synthetic unifying function." And the latter, in turn, is just the "productive synthesis" exerted by the understanding.

On the "genetic [*erzeugende*]" conception of scientific knowledge developed by the Marburg School, more specficially, "productive synthesis" is understood in terms of an essentially historical developmental process in which the object of science is successively constituted as the never completed "X" towards which this process is converging. In *Substance and Function* Cassirer applies the abstract conception of mathematics characteristic of the late nineteenth century to craft a similarly abstract version of this Marburg view. We conceive the historical developmental process as a sequence of abstract formal structures ("systems of order"), which is itself ordered by the abstract mathematical relation of approximate backwards-directed inclusion—as, for example, the new non-Euclidean geometries contain the older geometry of Euclid as a continuously approximated limiting case. (As will become clear in a moment, the new Einsteinian conception of space and time can be regarded as similarly containing the older conception of Newton as an approximate special case.) We can thereby conceive all the structures in the sequence as continuously converging on a final limit structure, of which all previous structures in the sequence are approximate special cases. The idea of such alimit is only a regulative ideal of reason in the Kantian sense—it can be progressively approximated but never actually fully attained. Nevertheless, it still constitutes the apriori "general serial

form" of our scientific empirical theorizing, and it bestows on this theorizing its characteristic from of objectivity.①

This essentially historical conception of scientific knowledge represents a second important point of similarity between Hegel and the Marburg School—which, as we shall see, is explicitly emphasized by Cassirer in the third volume of his *Philosophy of Symbolic Forms* (1929). In other respects, however, the Marburg conception diverges from Hegel. Where Hegel looks for an underlying unity of sensibility and understanding in an infinite divine Reason, the Marburg School, like Kant, remains with our finite human understanding and approaches the infinitely distant, never actually completed object of science as a mere regulative ideal. And, by the same token, it rejects the *Naturphilosophie* of Schelling and Hegel on behalf of the mathematical approach to nature characteristic of the Newtonian tradition. Nevertheless, the historical conception of the Marburg School, especially as developed by Cassirer, made explicit room for the scientific revolution that replaced both Newton's physics and Euclid's geometry with Einstein's general theory of relativity. Cassirer's 1921 monograph on this theory is still regarded as one of the most important, at the time, of its philosophical interpretations.

Cassirer began work on the philosophy of symbolic forms around the same time. He had finally been offered a professorship at the newly-created University of Hamburgin 1919, and he had found there a tremendous resource for his emerging philosophy of culture in the Warburg Library. Cassirer's earliest work on this topic appeared as studiesand lectures of the Library in the years 1922-1925, and the three volumes of *The Philosophy of Symbolic Forms* appeared, respectively, in 1923 (*Language*), 1925(*Mythical Thought*), and 1929 (*Phenomenology of Knowledge*). Cassirer now conceives human beings as essentially "symbolic animals," interposing systems of symbols between themselves and the world. What is most characteristic of his new view is a concern for the more "primitive" forms of symbolic world-presentation underlying the "higher" and more sophisticated cultural forms—a concern for the ordinary perceptual awareness of the world expressed primarily in natural language and, above all, for the mythical view of the world lying at the most primitive level of all. These more primitive manifestations of"symbolic meaning" now have an independent status and foundational role incompatible with both Marburg neo-Kantianism and Kant himself. They lie at a deeper and autonomous level of symbolic meaning, which then gives rise to the more sophisticated forms by a dialectical developmental process. From mythical thought religion and art develop; from natural language, theoretical science. It is here, as suggested, that Cassirer explicitly invokes Hegel's *Phenomenology of Spirit* as his model. Thus, the Preface to the third volume explains that its title employs the concept of *phenomenology* in precisely the Hegelian sense, and it invokes Hegel's well-known remark from his Phenomenology according to which philosophy must offer a "ladder" to ordinary consciousness on which to ascend to genuine (philosophical) science.② The Preface to Cassirer's second volume invokes Hegel in the same vein, emphasizing that, whereas Hegel had begun this ascent from ordinary perceptual consciousness ("sense certainty"), it is now clear that the "ladder" in question must actually begin one rung earlier in mythical through.③

The most primitive type of symbolic meaning, characteristic of mythical thought, is expressive meaning—

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①I discuss the "genetic" conception of knowledge and Cassirer's version of it in considerably more detailin Friedman (2000), where I also discuss his later philosophy of symbolic forms in similar detail.

②See (Cassirer 1929, vi-vii): "When I speak of a '*Phenomenology of Knowledge*,' I do not align myself with modern usage, but I go back to the fundamental meaning of 'phenomenology' as Hegel established and systematically grounded and justified it. For Hegel phenomenology becomes the fundamental presupposition of philosophical knowledge, because he requires of the latter that it comprehend the totality of spiritual forms, and because this totality, according to him, can only be made visible in the transition from one form to another. [The well-known remark from Hegel is here quoted.] It cannot be expressed more sharply that the end, the 'telos' of spirit cannot be grasped and expressed if one takes it as something self-subsistent, if one takes it as dissolved and separated from the beginning and the middle. Philosophical reflection does not set the end against the middle and the beginning in this way, but rather takes all three as integrating moments of a unitary total development."

③See (Cassirer 1925, ix-x): "Conceived in this way, the problem of myth extends beyond all psychological or psychologistic bounds, so as to introduce the universal domain of problems that Hegel designated as'phenomenology of spirit.' That myth stands to the universal task of the phenomenology of spirit in an internal and necessary relationship can be mediately derived from Hegel's own conception and determination of this concept. [The same passage from Hegel is quoted at greater length.] These propositions, in which Hegel characterizes the relationship of 'science' to sensible consciousness, are valid to the full extent and with full precision for the relationship of knowledge to mythical consciousness. For the proper point of departure for all becoming of science, its beginning in the immediate, lies not so much in the sphere of sensible intuition as in that of mythical [intuition]. . . . If, therefore, in accordance with Hegel's demand, 'science' is supposed to offer the ladder to natural consciousness that leads to itself, then it must set this ladder one rung lower."

the product of what Cassirer calls the expressive function (*Ausdrucksfunktion*) of thought. This type of meaning reflects the experience of events in the world around us as charged with affective significance, as desirable or hateful, comforting or threatening, and we can thereby explain the distinctive feature of mythical thought: its total disregard for the distinction between appearance and reality. For the mythical world does not consist of enduring substances manifesting themselves from various points of view and on various occasions, but in fleeting complexes of immediately perceived events bound together by their affective "physiognomic" character. What Cassirer call representative symbolic meaning, a product of there presentative function (*Darstellungsfunktion*) of thought, then has the task of precipitating out of the original mythical flux a world of stable enduring substances, distinguishable and reidentifiable as such. Working together with the pragmatic orientation towards the world exhibited in the use of tools and artifacts, it is in natural language, for Cassirer, that the representative function of thought becomes visible. For it is primarily through the medium of natural language that we construct the "intuitive world" of ordinary sense perception on the basis of what Cassirer calls intuitive space and intuitive time. We are now able to distinguish the enduring thing-substance from its variable manifestations from different (spatial) points of view and on different (temporal) occasions, and we thereby arrive at the distinction between appearance and reality. This distinction is expressed in its most developed form in the linguistic notion of propositional truth and thus in the propositional copula.

The notion of propositional truth then leads dialectically to a new task of thought—the task of theoretical science—of systematic inquiry into the realm of truths. Here we encounter the third and final function of symbolic meaning, the significative function (*Bedeutungsfunktion*) of thought, which is exhibited most clearly, for Cassirer, in the"pure category of relation." For it is only within the scientific view of the world originating in the sixteenth and seventeenth centuries that the pure relational concepts characteristic of modern mathematics, logic, and mathematical physics becomes finally freed from the bounds of sensible intuition. The result is the mathematical-physical world of the late nineteenth and early twentieth centuries: a pure system of formal relations in which the intuitive concept of substantial thing has finally been replaced by the relational-functional concept of universal law. It is here, and here alone, that the version of Marburg neo-Kantianism developed in Cassirer's earlier scientific works provides an accurate description of human thought. But this description is now seen as an abstraction from a more comprehensive dialectical process originating in the more concrete and intuitive symbolic forms. And it is in precisely this way that the Marburg conception of scientific knowledge becomes embedded within a more general conception of historical-cultural development self-consciously modeled on the Hegelian phenomenology of spirit.

As I noted at the beginning, however, when Cassirer systematically addressed (in1942) what had become known in the late nineteenth century as the relationship between the *Naturwissenschaften* and *Geisteswissenschaften*, in place of the latter terminology he used that of the *Kulturwissenschaften*. He thereby further distanced himself from the Hegelian problematic of *Natur* and *Geist*, and I shall conclude by addressing the deeper significance of this distancing.

Hegel had conceived nature and spirit as two different expressions of a single divine infinite Reason, which manifests itself temporally from two different points of view. His mature project of an encyclopedia of philosophical sciences then had three parts, the logic, the philosophy of nature, and the philosophy of spirit, where the logic had the task of depicting the dialectical conceptual structure of infinite divine Reason itself. But this Hegelian project for securing the ultimate logico-metaphysical identity of nature and spirit found ever fewer followers as the century progressed, as the rising tide of neo-Kantianism—aided by further developments within the natural sciences instigated by Hermann von Helmholtz—undermined the appeal of both *Naturphilosophie* and Absolute Reason. The result was the problem of the *Naturwissenschaften* and *Geisteswissenschaftenas* it presented itself to the late nineteenth and early twentieth centuries. Cassirer (in 1942) developed a characteristically methodological perspective on this problem by treating both disciplines as *empirical* rather than "speculative"sciences (in the sense of Schelling and Hegel) and elucidating their methodological relationship within the philosophy of symbolic forms.

Cassirer argues, in particular, that the empirical evidential basis for the cultural sciences starts from the same realm of perceived physical objects and processes distributed in space and time as do the natural sciences—in this case documents, artifacts, rituals, performances—but it goes on to imbue them with a symbolic "sense" or "meaning" that is not at issue in the natural science (1942, 48): "Like every other object, a cultural object has its place in space and time. It has its 'here' and 'now,' it arises and perishes. And, to the

extent that we describe this 'here' and 'now,' this arising and perishing, we do not need to go beyond the circle of physically established facts. But, on the other side, the physical itself appears in the object in a new *function*. It not only 'is' and 'becomes,' but in this being and becoming something new appears. This appearance of a 'sense [*Sinn*],' which is not absorbed by the physical, but is rather embodied in it, is the common element of all those contents that we designate with the term 'culture'." We must distinguish, accordingly, between the representative function (*Darstellungsfunktion*)and the expressive function (*Ausdrucksfunktion*) of thought, and only a prejudiceprivileging "thing perception [*Dingwahrnehmen*]" over "expressive perception[*Ausdruckswahrnehmen*]" can support the idea that the natural sciences have a more secure evidential basis than he cultural sciences. For Cassirer, by contrast, both forms of perception are equally legitimate. While the natural sciences take their evidence from the sphere of thing perception, the cultural sciences take theirs from the sphere of expressive perception—and, in the first instance, from our lived experience in a human community sharing a common system of "cultural meanings."

Yet we also have the capacity, in the cultural *sciences*, to extend such meanings beyond their originally local contexts. Whereas intersubjective validity in the natural sciences rests on universal laws of nature ranging over all (physical) places and times, an analogous type of intersubjective validity arises in the cultural sciences independently of such laws. Although every "cultural object" has its own individual place in (historical)time and (geographical-cultural) space, it can still continuously approach a universal cultural meaning (in history or ethnography) as it is continually *interpreted and reinterpreted* from the perspective of other times and places:

> The goal [of cultural science] is not the universality of laws, but neither is it the individuality of facts and phenomena. In contrast to both it establishes its own ideal of knowledge. What it wishes to know is the *totality of forms* in which human life is realized. These forms are infinitely differentiated, but they do not lack unified structure. For it is ultimately the "same" human being that we always continually encounter in the development of culture, in thousands of manifestations and in thousands of masks. We do not become conscious of this identity through observation, weighing, and measuring; nor do we infer it from psychological inductions. It can prove itself in no other way than through the act. A culture only becomes accessible to us in so far as we actively enter into it; and this entry is not bound to the immediate present. Here temporal distinctions, distinctions of earlier and later, are relativized, just as spatial distinctions, distinctions of here and there, are relativized in the viewpoint of physics and astronomy. (Cassirer 1942, 84-85).

Universal cultural meaning thereby emerges only asymptotically, in a way similar to the genetic conception of knowledge of the Marburg School (now seen as based on the significative function of thought). Rather than an abstract mathematical relation of backwards-directed inclusion, however, we are concerned, in the historical cultural sciences, with a hermeneutical relation of backwards-directed interpretation and reinterpretation—and, as a result, there is no possibility, in these sciences, of reliably predicting the future.

We can further illuminate Cassirer's evolving attempt to situate himself between Hegel and Kant by considering his evolving relationship to Heidegger. In the 1929 Disputation at Davos Cassirer challenged Heidegger's radical "finitism" by appealing to the presumed necessary and eternal validity found in both the mathematical sciences and morality.① 13 And after the Disputation Cassirer added five footnotes to *Being and Time* (1927) in *The Phenomenology of Knowledge* before its publication, where he suggested that his attempt to extend the Hegelian "ladder" one rung lower could also address Heidegger's concerns. In 1931, however, Cassirer published a review of Heidegger (1929), which took a different approach from his remarks at Davos. Instead of primarily emphasizing the "eternal" validity found in the mathematical sciences, Cassirer now placed his main emphasis on the ethical and aesthetic dimensions of Kant's thought, as expressed in the *Critique of Practical Reason* and the *Critique of the Power of Judgement*. His main point was that, whereas the *Transcendental Analytic of the Critique of Pure Reason* may indeed be written from the perspective of human finitude, the rest of Kant's system embeds this perspective within a wider conception of "the intelligible substrate of humanity."

Cassirer's 1931 discussion, in my view, mirrors his just-completed attempt to embed the Marburg genetic conception of knowledge within a wider conception of the development of human culture as a whole. The way

① I discuss the Davos Disputation, and, more generally, the ongoing relationship between Cassirer and Heidegger, is considerably more detail in Friedman (2000). It turns out, as I explain, that Rudolf Carnap attended this Disputation as well, and so I also discuss in detail the relationship between Cassirer and theVienna Circle of logical positivists—especially Carnap.

in which Cassirer situates his new philosophy of culture with respect to both Hegel and Heidegger then illuminates his fundamental divergence from Hegel—as it comes to be expressed in Cassirer's works on history and culture after he leaves Germany for good in 1933. By building the Marburg conception of knowledge, in his new philosophy of culture, on top of the lower rungs of the Hegelian "ladder" (mythical thought and ordinary language), Cassirer takes himself to have done justice to the insights of both Hegel and Heidegger while avoiding both the infinite divine reason of the former and the radical human finitude of the latter. Yet he has now conceded to Heidegger that Kant's theory of human cognition involves only the notion of potential rather than actual infinity. In particular, Kant's treatment of the regulative use of the ideas of reason from a merely *theoretical* point of view leaves theiractual content quite indeterminate. In the case of the idea of transcendental freedom, for example, we are only able to determine it negatively (from a theoretical point of view), as a species of causality that is *not* bound by the conditions of time-determination governing the phenomenal world.

In the *Critique of Practical Reason*, however, Kant asserts that transcendental freedom acquires a determinate content from pure *practical* reason, through our immediate awareness of the moral law as normatively binding on our will, and that the(practical) objective reality thereby conferred on this idea can then be transferred to the ideas of God and Immortality. This is because the moral law unconditionally commands us to seek the Highest Good—the realization of the Kingdom of Ends here on earth—which is an *infinite* task requiring *infinite* (practical) faith and hope. The resulting divergence from the indeterminate and merely potential infinity arising within theoretical reason is visible in the famous passage on the starry heavens above me and the moral law within me at the end of the *Critique of Practical Reason*, from which Cassirer quotes in his 1931 review of Heidegger.①

What the *Critique of the Power of Judgement* adds is then the further idea, as I suggested at the beginning, that rigorous mathematical scientific understanding of the phenomenal world runs out considerably before we arrive at the history of human culture, so that the future is in principle open to the possibility of our continuously approximating the Highest Good without limit. But Cassirer, as we have just seen, has now achieved aparallel result though his methodological distinction between the natural and the cultural sciences. He is thereby in a position to replace what he takes to be the oppressive (speculative) infinity of Hegel's Absolute Reason with the liberating (practical) infinity of our human (practical) reason:

> In his philosophy of history Hegel wanted to provide the definitive speculative demonstration that reason is substance and infinite power. For this, however, we must, according to him, above all attain the insight that reason is "not so powerless as to pass for a mere ideal, amere ought." *This* form of proof has become shaky; the critique of the foundations of the Hegelian system has pulled the ground out from under it. If we turn back from the Hegelian meaning of idea to the Kantian, from the idea as "absolute power" back to the idea as "infinite problem," we must of course give up the speculative optimism of the Hegelian view of history. But, at the same time, we thereby also avoid fatalistic pessimism with its prophecies and visions of decline. [Our] acting again has a free path to decide for itself out of its own force and responsibility, and it knows that the direction and future of culture will depend on the manner of this decision. (Cassirer 1939, 28)②

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① The Kantian passage, quoted at greater length than by Cassirer, runs as follows (Ak. 6, 161-162): "Two things fill the mind with ever new and increasing admiration and reverence, the more often and more steadily one reflects on them: the starry heavens above me and the moral law within me. . . . The first begins from the place I occupy in the external world of sense and extends the connection in which I stand into an unbounded magnitude with worlds upon worlds and systems of systems, and moreover into the unbounded times of their periodic motion, their beginning and their duration. The second begins from my invisible self, my personality, and presents me in a world which has true infinity but which can be discovered only by the understanding, and I cognize that my connection with that world (and thereby with all those visible worlds as well) is not merely contingent, as in the first case, but universal and necessary."Note Kant's emphasis on the "true" infinity involved in the practical case, which goes beyond the merely potential and indeterminate infinity involved in the theoretical case. This is because, for Kant, we do know the determinate content of the moral law (and therefore of the Highest Good) by pure practical reason(independently of sensibility), whereas we can by no means determinate in advance what we will find in progressing from our parochial perspective here on earth, to the center of gravity of the solar system, to the center of gravity of the Milky Way galaxy, and so on *ad indefinitum*. For the latter progression see again Friedman (2013).

② This 1939 article on "Naturalistic and Humanistic Foundations of the Philosophy of Culture" belongs to the same train of thought developed more fully in *The Logic of the Cultural Sciences*—so much so, in fact, that the earlier (1961) English translation uses this article as an Introduction. My rendering of the above passage, however, diverges substantially from the 1961 version.

For Cassirer, therefore, our cultural future always lies open, and it is always up to us.

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［责任编辑　孟建伟 郝苑］