

Vienna Circle Institute Yearbook

Donata Romizi
Monika Wulz
Elisabeth Nemeth *Editors*

Edgar Zilsel: Philosopher, Historian, Sociologist



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Elisabeth Nemeth
Editors

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**Vienna Circle
Society**

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Chapter 7

Facts of Nature or Products of Reason? Edgar Zilsel Caught Between Ontological and Epistemic Conceptions of Natural Laws



Donata Romizi

Abstract In this paper, I reconstruct the development and the complex character of Zilsel’s conception of scientific laws. This concept functions as a *fil rouge* for understanding Zilsel’s philosophy throughout different times (here, the focus is on his Viennese writings and how they pave the way to the more renowned American ones) and across his many fields of work (from physics to politics).

A good decade before Heisenberg’s uncertainty principle was going to mark the outbreak of indeterminism in quantum physics, Edgar Zilsel started to develop a complex logical-philosophical theory in which statistical and causal laws were given an indeterministic foundation. However, in developing his thoughts on the emergence of regularities from disorder, Zilsel arrives at a profound ambiguity with respect to the ontological or the epistemic nature of laws and order in the world: Whether this order is to be conceived of as an empirical finding or as the product of reason – this would have to remain unclear. This tension between rationalism and empiricism, as well as a tension between a realist and an anti-realist conception of lawfulness, can be identified in both Zilsel’s Viennese and American writings: a tension which touches the core of the “problem of application” that would keep haunting Zilsel until his premature death.

Keywords Scientific laws · Probability · Causality · Rationalism · Empiricism · Kantianism · Marxism · Vienna Circle

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7.1 Introduction

The issue of scientific (in the epistemic parlance) or natural (in the ontological parlance) laws is an ideal point of reference for gaining a unitary perspective on Edgar Zilsel's work. By focusing on this concept, a remarkable continuity in his work can be identified, which characterizes both his earlier Viennese and his later American writings and projects. Throughout his life, his work proceeded on two parallel tracks:

1. On the one hand, he developed a philosophical reflection about the nature of scientific laws.¹
2. On the other hand, he pursued empirical² research in order to *find out* laws – especially in the historical-sociological domain.³

In fact, Zilsel's concept of “natural laws” goes beyond the domain of the natural sciences; or – to put it differently – Zilsel has a broader concept of what should be considered as the domain of natural sciences: in a letter to Reichenbach written in 1930, Zilsel explains how he “considers historical processes themselves as natural processes.”⁴ Zilsel's conception of scientific or natural laws is thus also revealing of a very important belief at the core of his philosophical and scientific stance: the belief in a fundamental unity of the sciences.⁵

¹For the Viennese period, see especially: Zilsel (1916): *Das Anwendungsproblem*; Zilsel (1921): “Versuch einer neuen Grundlegung der statistischen Mechanik;“ Zilsel (1925): review of B. Bauch, *Das Naturgesetz*; Zilsel (1927a): “Über die Asymmetrie der Kausalität und die Einsinnigkeit der Zeit;“ Zilsel (1928): “Naturphilosophie;“ Zilsel (1930a): “Soziologische Bemerkungen zur Philosophie der Gegenwart“. For the American period, see especially: Zilsel (2003²/1941a): “Problems of Empiricism“ and Zilsel (2003²/1941b): “Physics and the Problem of Historico-sociological Laws,“ which can be considered as the published output of a broader research project on the concept of law (see Raven and Krohn 2003, §II.5).

²The term “empirical” must be taken with caution, since Zilsel's historical-sociological inquiries were kindred rather to the history of ideas than to empirical-quantitative sociology. This may be the reason why Zilsel's work was initially ignored in the emerging field of sociology of science (see Fleck 1993, 511, and in this volume). Zilsel's views on quantitative and qualitative methods in sociology and the development of sociology as a scientific discipline can be found in Zilsel (2003²/1941a, 194–195).

³For the Viennese period, see his works on the concept of genius: Zilsel (1990/1918): *Die Geniereligion* and Zilsel (1972/1926): *Die Entstehung des Geniebegriffes*. For his American period, see in particular the articles he published in 1942, “The Sociological Roots of Science” and “The Genesis of the Concept of Physical Law“ (Zilsel 2003/1942a, 2003/1942b), which are the main published output of a much broader project on the social origins of modern science (see Raven and Krohn 2003, §II.2–4).

⁴The letter is reported already in the English translation in Raven and Krohn (2003, xlix). On Zilsel's conception of historical laws, see Nemeth (2011).

⁵Describing his conception of philosophy as a “Gesamttheorie“, which allows a unitary and trans-disciplinary perspective on the problems dealt with in different sciences, Zilsel claims as early as in 1929 that a precondition for such a unitary perspective is “a conflation between the reasoning [*Gedankengänge*] of the natural sciences and the historical-sociological one” (Zilsel 1992/1929, 44; my translation). Arguments in favor of the unity of the sciences can be found throughout his work, e.g., in Zilsel (1928, 138), where he rejects the neovitalistic idea of an essential difference

Even if Zilsel shared this belief to some extent⁶ with the Vienna Circle, he would charge the Circle, and in particular Otto Neurath,⁷ with a lack of engagement in pursuing the second of the above-mentioned research tracks – we can call it the “empirical track.” Raven and Krohn have argued that “for Zilsel, the Vienna Circle could be ironically characterized as an empirical school without empirical research.” (Raven and Krohn 2003, xlv) A similar criticism was directed by Zilsel to his fellow Marxists: one should not have rested content with theorizing the existence of laws in the historical-sociological domain: one had to find out some.⁸ However, Thomas Uebel – defending Neurath from Zilsel’s criticism – has argued: “Surely it cannot be expected of a philosophy of social science that it delivers what only social science itself can deliver.” (Uebel 2007, 256) Under this perspective, Zilsel appears almost as somebody who could not choose whether he wanted to be a philosopher or a sociologist.

Indeed, Zilsel’s “double-track” work was quite idiosyncratic. Raven has provided an explanation for it by emphasizing Zilsel’s empiricist standpoint and then arguing as follows:

His goal was to demonstrate the feasibility of laws in the humanities. Given his philosophical position, he could not just argue the case in general. He had to show, through detailed socio-historical analysis, that causal historical and comparative research was possible. (Raven 2003, 230)⁹

between life phenomena and physical ones, as well as in Zilsel (1930a, 411), and in Zilsel (2003²/1941b), where he argues that there is no difference in principle between history and natural science with respect to the possibility of finding out laws. Furthermore, his second book on the concept of genius seems to aim directly at rejecting Dilthey’s distinction between “understanding” and “explaining” sciences (see e.g., Zilsel (1972/1926), 2 and 323).

⁶As Raven and Krohn remarked, “Zilsel did not believe that a program based on logical analysis and language construction could help in uniting the social and natural sciences” (Raven and Krohn 2003, xlv). More about Zilsel’s own conception of the unity of science is to be found in Raven (2003). Further points of dissent between Zilsel and the Vienna Circle are mentioned in Nemeth (1997, 159, 2011, 521). Whether Edgar Zilsel may be considered a member of the Vienna Circle is a controversial issue: Stadler (2015, 494–497), Rutte (1993) and Dahms (1993) count him as a member of the Circle; Dvořák (1981, see in particular Ch. 5) provides a more complex picture and reports a significant remembrance by Herbert Feigl: “[T]here were two outstanding brilliant minds in Vienna who, though close to us in philosophical orientation, never joined the Circle: Edgar Zilsel and Karl R. Popper. Both were convinced of their intellectual independence from us, and tried to preserve that independence by remaining outside the Circle” (Dvořák 1981, 56).

⁷See Zilsel (1992/1932c).

⁸Zilsel writes for example in the social democratic journal *Der Kampf* in 1931: “Precisely because I think that Marx’s theory in its most radical version is true I struggle against its abuse. The validity of this theory has not been properly proved and confirmed yet. One should finally check it against the historical empirical evidence.” (Zilsel 1992/1931b, 214; my translation).

⁹Wulz gives Zilsel’s empiricism a special flavor with her interpretation of Zilsel’s concept of “application”: according to her, it would imply a “circularity and mutual dependence between the theoretical and the empirical practices [...] Thus, the application is not the opposite of scientific research, but it is rather an essential component of any piece of knowledge [*Erkenntnis*]” (Wulz 2011, 305; my translation).

This is certainly a very plausible explanation. However, the philosophical roots of Zilsel's "double-track" research program are already visible, as I argue, in his early writings, where his commitment to empiricism is quite ambiguous. These roots are to be found precisely in Zilsel's oscillation between a rationalist and an empiricist standpoint.

In this paper, I will reconstruct Zilsel's pathway from this initial ambiguity to the ripe version of his "double track" research program. It is precisely because of the tension between a rationalist and an empiricist standpoint that Zilsel developed an ambivalent perspective on scientific laws, oscillating between an epistemic and an ontological conception of them. In reflecting *on* the nature of laws, Zilsel often adopts a de-ontologizing or de-naturalizing perspective on them. In his early works, he tends towards a Kantian conception of laws: he apparently conceives of them as ways in which reason brings reality or experience into a rational order.¹⁰ In his later works, he tends towards a constructivist conception of laws, conceiving of them as a contingent product of the socio-historical development of science.¹¹ In any case, Zilsel's epistemic conception of laws presents them as being not facts, but rather "artefacts," products of reason or of some contingent socio-historical conditions. This perspective corresponds to the first of his two research tracks. Contrariwise, in his historical-sociological inquiries, Zilsel *looks for* laws. Under this perspective, laws are conceived as "facts" to be found out: this I call Zilsel's ontological, or realist, conception of laws, which corresponds to the second research track.

In the next sections, I will go back to Zilsel's first book, *Das Anwendungsproblem* (1916), where the above-mentioned tension between a rationalist and an empiricist standpoint is most evident: it appears in Zilsel's conception and justification both of statistical and causal laws, as I will show in Sects. 7.2, 7.3, and 7.4. Here, I will also show how this tension leads to Zilsel's ambivalent conception of scientific laws. These Sects. (7.2, 7.3, and 7.4) have a strong focus on *Das Anwendungsproblem* and they have the additional aim of contributing to an understanding of this very complicated book, the contents of which – to my mind – have not yet been satisfactorily explored in detail.¹² In Sect. 7.5, I consider Zilsel's later "Viennese writings," which have a strong political background, in order to show the evolution of his standpoint

¹⁰The main example of this tendency is Zilsel's first book, *Das Anwendungsproblem* (The Problem of Application), as we shall see below.

¹¹The main example is Zilsel (2003/1942b).

¹²Immediately after its publication, Zilsel's book was lively discussed (see e.g., the reviews by Bernhard Bavink (1916) and Hans Hahn (1917)), and thanks to this book Herbert Feigl even made his "existential choice" of dedicating his life to philosophy (see Dvořák 1981, 133, footnote 48). In more recent literature, however, only Dvořák (1981, Ch. 4) and Lenhard and Krohn (2006 and in this volume) had dared to discuss *Das Anwendungsproblem* in detail, and only Lenhard and Krohn offer a philosophical and systematical analysis. A very good reconstruction of the general epistemological tenets emerging in *Das Anwendungsproblem* is to be found in Wulz (2011), 296–300. I offer a detailed philosophical-systematical analysis of Zilsel's *Das Anwendungsproblem* in Romizi (2019), §7.b.

especially with respect to his ambivalent conception of scientific laws. This evolution led very naturally to the double-track work Zilsel would pursue in his American exile,¹³ as I point out in the Epilogue.

7.2 The “Problem of Application” and the Law of Large Numbers

The first of Zilsel’s books (Zilsel 1916) is devoted to the “problem of application,” which consists in asking how it is possible that our scientific theories fit nature. Should we argue that natural phenomena themselves happen according to laws? Should we say, with Kant, that the order or the laws we find in nature are just those that we ourselves have given to it? Even if in *Das Anwendungsproblem* Zilsel admits that his approach can be framed in many ways into a Kantian framework,¹⁴ he will not really provide, as we shall see, a smooth Kantian solution. Instead, he will get caught up in a tension between a rationalist and an empiricist epistemological standpoint, and this tension will give rise to an ambivalent conception of scientific laws.

The subtitle of Zilsel’s *Das Anwendungsproblem* (1916) is: “A philosophical essay on the law of large numbers and induction.”¹⁵ The law of large numbers plays a major role in Zilsel’s conception of natural laws. It guarantees, namely, that, in the long run (or if we take a sufficiently large number of similar events into consideration), stable frequencies and statistical regularities will appear out of chance phenomena. Similarly, as we shall see, Zilsel conceived of natural/scientific laws as a

¹³With one remarkable difference: the political background that was so evident in the Viennese writings suddenly disappears in the American ones. It is not surprising that Zilsel did not want to present himself as a Marxist and Social Democrat while trying hard to settle in the USA. On the depoliticization of philosophy of science in the USA, see Reisch (2005); however, his main focus is on the period of the Cold War and he explicitly leaves out Zilsel (see p. xiii).

¹⁴In the “Foreword” of the book, Zilsel writes: “Anyone familiar with the history of philosophy will notice how strong the present treatise depends on Leibniz, Kant and Spinoza” (1916, VI; my translation). Two Kantian features can be easily recognized in Zilsel’s book. The first is the way in which Zilsel formulates the application problem, which can be paraphrased as follows: there *are* scientific theories that can successfully be applied to experience – how is it possible? This question, so formulated, calls of course for a transcendental deduction: as I will show below, this is in fact the main kind of proof Zilsel uses in his book, and the second evident Kantian element. Other interesting passages of Zilsel’s book referring to Kant are: his interpretation of the so-called “copernican revolution” in Kantian philosophy (1916, 75–76; more about this below) and his interpretation of Kant’s conception of the *a priori* (1916, 143–145). As I will mention below, also some relationships with Neo-Kantianism can be plausibly supposed, even if Zilsel does not mention them explicitly.

¹⁵My translation of: „Ein philosophischer Versuch über das Gesetz der großen Zahlen und die Induktion“.

kind of natural order emerging from a fundamental lack of order.¹⁶ Furthermore, the law of large numbers directly touches the core of Zinsel's "application problem": it states that, in the long run, the empirical frequency with which a certain phenomenon occurs (nature) tends to correspond to its mathematical probability (theory). For example, the mathematical probability of throwing a three with a die is $1/6$. The law of large numbers guarantees that, if we throw a die enough times, the frequency with which the result three will appear will tend to be 1 out of 6. How is it possible to have this guarantee of a correspondence between our mathematical theory and nature? The answer cannot simply be that the mathematical probability fits nature because it is – so to speak – modeled after it. The probability calculus is namely a logical, analytical construct, and, in this respect, it is to some extent – as Zinsel himself says – "arbitrary" (*willkürlich*, Zinsel 1916, 4 and 13). I will come back to Zinsel's interpretation of probability below. Keeping now the focus on Zinsel's conception of laws, it is important here to understand how – according to Zinsel – natural laws emerge from a lack of order.

The core of Zinsel's theory is what he calls the "doctrine of universal diverseness" (*Lehre der Allverschiedenheit*), which Zinsel sees as akin to Leibniz's monadology,¹⁷ but which in fact reminds of a typical argument of the late nineteenth century indeterminists (like Boutroux, Fechner, and Peirce¹⁸). This doctrine states that "no two things are exactly alike, whether events or processes." (Zinsel 1916, 22; my translation) This tenet, in Zinsel's book, becomes the keystone of an entire system in which determinacy, rationality, and natural laws are inferred from accidental variations, indeterminacy, and irrationality – as we will see below.

The "doctrine of universal diverseness" itself is deduced by Zinsel from what he calls "intension-extension-relationship" (*Inhalt-Umfang-Relation*), which refers to the relationship between intension and extension in logic.¹⁹ This relationship is, as is well known, one of inverse proportionality: The higher the number of properties that characterize the intension of a concept or idea is, the lower the number of individuals who possess all of them is. Vice versa, the more individuals we take into consideration, the smaller the number of properties that are common to all of them becomes. If we restrict the extension as much as possible, so that it comes to consist only of a single individual or event, the intension will reach its maximum, and will

¹⁶This conception of natural laws is similar to Franz Serafin Exner's, which is not surprising, since Zinsel studied physics in Vienna at the time in which Exner was a major figure at the Institute of Physics and at the University of Vienna in general (more on Zinsel, Exner and the "Austrian context" in Romizi 2019, Ch. 7).

¹⁷References to Leibniz appear repeatedly in the course of Zinsel's book, and particularly often in the logical deduction of the doctrine of universal diverseness.

¹⁸See Romizi (2019), §6.b. (Boutroux), §4.d. and §6.a. (Fechner), and §6.c. (Peirce).

¹⁹Zinsel (1916, 31) explicitly states that with "Inhalt" he means what in Russell and Whitehead's *Principia mathematica* is called "propositional function," while his concept of "Umfang" corresponds to "class" (Russell, Couturat) or "Menge" (Cantor, Zermelo).

consist of an almost infinite²⁰ number of properties. The doctrine of universal diverseness, then, follows from the “intension-extension-relationship,” since to each single individual or event corresponds a unique, almost infinite set of properties, so that – according to Zilsel – two things or events can never be alike.

Zilsel then introduces the “theorem of radical decrease of intension” (*Satz von der durchgreifenden Inhaltsabnahme*). This theorem states that with the increase of the extension (that is, of the number of the individuals or events we consider), not only the whole intension diminishes, but also the frequency of the occurrence of each property that constitutes it. As Zilsel writes: “not only nature disdains repetitions, not only multifariousness and change dominate in general, but individuals – things and events – also manifest the tendency to change in every single character.” (Zilsel 1916, 41; my translation)

An example by Zilsel himself (1916, 41) will help both in clarifying the issue and going further with the argument towards the inference of the law of large numbers. The example refers to the classical series of throws of a die. A single throw, as stated by the “doctrine of universal diverseness,” is unique and not repeatable, and corresponds to an almost infinite set of properties, which all together constitute its intension. Assuming we go on casting the die, the more throws we consider, the fewer the properties they have in common will be. Not only that: the “theorem of radical decrease of intension” also states that each single property will tend to not appear again. So, for example, the property “three (with respect to the result)” will tend not to come out again. However, since this tendency holds for each property, and thus also for each other result than “three,” this kind of mutual compensation between each tendency to vary will give rise to the stable frequencies which characterize the law of large numbers. The idea of stable statistical frequencies being the result of some mutual compensation was certainly not new in the history of probability theory.²¹ Also, one can easily object that the emergence of stable frequencies does not need to be produced by a tendency of properties to *not* repeat themselves: it could be deduced equally well from the opposite tendency of properties to repeat themselves. In fact, the result of the mutual compensation of the tendency of each result to *appear* again would be the same. Still, Zilsel proves to be quite original in trying to develop a logical-mathematical calculus not only to deduce the law of large numbers from the relationship between intension and extension, but even to derive from his doctrine of the universal diverseness the stable frequencies of statistical laws.²²

²⁰Zilsel (1916, 37–38) speaks of an intension which is “indeed definite” [*bestimmt*] but “of colossal dimensions” [*ganz außerordentlich groß; ganz kolossal groß*].

²¹Also Meinong and Timmering, both in 1915, had deduced the law of large number from a kind of compensation (*Ausgleich*): both authors are discussed by Zilsel in the Appendix II of *the Problem of Application*. The idea of statistical compensation was already common in the nineteenth century (see for example Krüger 1987).

²²Unfortunately, Zilsel’s logical system and deduction are flawed, as Thomas Mormann showed me in a private correspondence and as Hans Hahn probably noted as he wrote a critical review of Zilsel’s book (see Hahn 1917). The overall tone of this review is positive, though. Zilsel himself

Going back to the central question of the present paper, we can now ask: what is the nature of the stable frequencies and the statistical regularities that emerge according to the law of large numbers? Is this emerging order a fact of nature or a product of reason? Zilsel is not clear in this respect. On the one hand, as we have seen, he has traced everything back to a purely logical relation, that between intension and extension. And this he has done deliberately, since in the “Introduction” to the volume he declares as his purpose to deduce the law of large numbers in an analytical way, without any reference to experience (Zilsel 1916, 21). On the other hand, Zilsel apparently has a strong need to state that the kind of order he is talking about is indeed “real.” He argues that the law of large numbers expresses a real and concrete property of nature (*sagt ein Naturverhalten aus*, Zilsel 1916, 41). He claims that the universal diverseness expresses the very structure of nature (Zilsel 1916, 22 and 36–38). And he even says – contradicting himself – that the relationship between intension and extension is *not* a purely logical relationship but it rather asserts a “fact of nature” (*Naturtatsache*, Zilsel 1916, 24). Thus, it is not clear whether the kind of order that the law of large number shows is a purely logical one or a feature of reality. Sometimes it seems to be both, and it seems that Zilsel sees the connection between the two sides in a Kantian way. Commenting on Kant’s *Critique of Pure Reason*, Zilsel writes: “Since the laws of nature [*Naturgesetze*] (at least the most general ones) must coincide with the laws of cognition [*Gesetze der Erkenntnis*], it does not really make a difference from which side we want to approach the problems.” (Zilsel 1916, 76)²³ This would have been a smooth Kantian solution to the problem of application. However, Zilsel rejects Kant’s concept of *a priori* (Zilsel 1916, 143–145), and his deduction of the “doctrine of universal diverseness” and of the law of large numbers from the relationship between intension and extension seems to be a purely analytical one. Being, thus, unable to reach a safe Kantian harbor, Zilsel is left with his application problem still pending, and he remains at the mercy of opposite winds: a rationalistic and an empiricist one. His interpretation of probability is a major example of this.

wrote to Reichenbach in 1925: “By the way, my *Application Problem* contains a lot of mistakes. To make mistakes seems to adhere to the essence of philosophy; one only wishes to have a philosophical method in which right and wrong are discernible at all, and in which the mistakes are discovered as quickly as possible” (quoted in English in: Raven and Krohn 2000, footnote 71).

²³ Here I see not only a Kantian framework, but also a possible influence of Mach’s theory according to which the difference between the physical and the psychical is not an ontological one but only a difference of perspective on one and the same phenomena (Mach 2008/1911⁹).

7.3 Zilsel's Ambivalent Conception of Probability

Zilsel's ambiguity about the logical or empirical nature of the law of large numbers appears again in his interpretation of probability, which oscillates between a rationalistic and an empiricist standpoint.²⁴ In the long "Introduction" (Zilsel 1916, 1–27) to *Das Anwendungsproblem*, Zilsel seems to tend toward an empiricist, frequentistic conception of probability, and nonetheless he does not entirely renounce an *a priori* formulation of the law of large numbers. Finally, he explicitly gives up a clear standpoint: referring to the law of large numbers, he affirms: "Now, I do not want at all to get involved in any discussion about the question whether our 'law' has an *a priori* or an empirical origin." (Zilsel 1916, 20; my translation)

In the course of the book,²⁵ Zilsel repeatedly emphasizes the empirical confirmation of the law of large numbers in order to argue against epistemic and *a priori* conceptions of probability: probability – he claims – is not to be confused with the psychological concept of expectation, nor has it a purely logical nature. He also criticizes the classical epistemic notion of probability based on the concept of "equi-possible cases" as being circular (Zilsel 1916, 127). Like a convinced advocate of frequentism, he claims that it is meaningless to speak of the probability of a single event (Zilsel 1916, 16 and 131)²⁶ and that there are only mathematical probabilities *a posteriori* or relative frequencies.²⁷ He also wants to provide us with a formulation of the law of large numbers that – he claims – does not entail any *a priori* concept: "In mass phenomena there are (almost) constant average values." (Zilsel 1916, 13; my translation)

Still, this is in contrast with the overall, explicit rationalistic framework in which the book is written.²⁸ This rationalistic standpoint pushes Zilsel's arguments on probability in the opposite direction. Thus, he steps back from the idea (which would later be embraced by von Mises) of defining probability tout court *as* relative

²⁴A shift from our initial question (does Zilsel consider natural laws as being facts of nature or products of reason?) must be remarked here, since the polarity reason/nature (or theory/reality) does not correspond entirely to the polarity rationalism/empiricism. Still, Zilsel himself does not clearly distinguish the question about the relationship between our theories and *reality/nature* (problem of application) from the question about the relationship between our theories and *experience*. There is only one passage (1916, 155) in *Das Anwendungsproblem* in which Zilsel suddenly appears aware of this issue: here he states that he does not want to speak of reality (*Wirklichkeit*) anymore, but only of "the given" (*das Gegebene*). The concept of "the given" plays a major role in the second part of the book and it allows Zilsel to gradually substitute the "realist parlance" about the structure of nature with an "empiricist parlance" about the empirically given.

²⁵See in particular the Chaps. 1, 2, and 3.

²⁶However, other than the classical frequentists Zilsel derives this claim from his "doctrine of universal diverseness."

²⁷Zilsel (1916), 12. See also p. 184: "My treatise admits only *a posteriori* probabilities, or, even stricter, only relative frequencies" (my translation).

²⁸As mentioned above, Zilsel writes in the introduction that his work is influenced especially by Leibniz, Spinoza, and Kant.

frequency,²⁹ since this could not guarantee – he argues – that the probability of *an* event (!) would take a precise value that remains stable in the future (Zilsel 1916, 11–12). Furthermore, he rejects any empirical or inductive justification of the law of large numbers, wanting to provide – as we have seen – a purely logical deduction without any reference to experience (Zilsel 1916, 19–21).³⁰ After having traced back the law of large numbers to the logical relationship between intension and extension, Zilsel even comes very close to a logical interpretation of probability, since he defines probability as a relationship of implication between intensions (*Inhalte*, Zilsel 1916, 124), for example between the intensions “die cast” and “three cast.”

However, with another turn in his argumentation, he immediately specifies that the mathematical determination of these intentions occurs *a posteriori* through the reference to empirical frequencies. Probability in general – he claims – presupposes a great amount of experience, for example about games of chance or the falling of bodies like dice (Zilsel 1916, 125–127).

Zilsel’s interest for the interpretation of probability would remain strong until the early 1930s.³¹ Due to his being caught between a rationalist and an empiricist standpoint, he would not find a solution to his “application problem.” In the first issue of *Erkenntnis* (1930b/31), we find Zilsel discussing probability with his “fellow”³² Logical Empiricists. As is well known, some of them defended a logical (Waismann and Carnap) and some of them an empirical-frequentistic (von Mises, Reichenbach) interpretation of probability.³³ The empiricist Zilsel objected against the logical (as well as any epistemic) interpretation of probability that it would never be capable of explaining the empirical fact of the actual convergence of relative frequencies (Zilsel 1930b/31, 260). The rationalist Zilsel objected against the frequentist interpretation of probability that it would never be capable of justifying the inductive inference which should guarantee the validity of probability values in the future (Zilsel 1930b/31, 262). The law of large numbers appears here, again, both as a fact of nature in need of an explanation and as a mathematical construct promising to go beyond actual experience and to remain valid in the future. The link between the fact of nature and the mathematical construct is still missing; no wonder that Zilsel

²⁹Note that this definition would dissolve the application problem, as referred to the law of large numbers (How is it possible that mathematical probabilities fits empirical relative frequencies?), in a tautology.

³⁰Zilsel argues in a very subtle way that an empirical justification of the law of large numbers would be aporetic (see also p. 123).

³¹See Zilsel (1921), where he tries to give a new foundation to statistical mechanics; Zilsel (1925, 1927a), where he defends the scientific and objective character of statistical causality and indeterministic theories; Zilsel (1927b), which is a critical review of Keynes’s famous book *On probability*; Zilsel (1930b/31), where he appears in the discussion on probability that had taken place in the context of the “First Congress for the Theory of Knowledge of the Exact Sciences” organized by the Logical Empiricists in Prague in 1929; Zilsel (1932a), which is a review of Mises’s *Wahrscheinlichkeitsrechnung und ihre Anwendung in der Statistik und theoretischen Physik*.

³²As already mentioned, Zilsel’s belonging to Logical Empiricism cannot be affirmed without specifications (as Schlaut (2018, 267), for example, does).

³³On the issue of probability in Logical Empiricism, see Galavotti (2008).

himself at the end of the discussion declares the application problem to be still unsolved, and he even delivers a pleading: “No matter in which box one puts the application problem. Please: somewhere it has to be dealt with!” (Zilsel 1930b/31, 272; my translation) Evidently, 15 years after the publication of *Das Anwendungsproblem*, Zilsel considered the problem as still relevant but still unsolved, which means that he did not believe (anymore?) to have offered himself a viable solution in his first book. Zilsel’s failure in solving the problem of application is due to the unsolved tension between a rationalist and an empiricist standpoint that is evident in his way of dealing with the interpretation of probability and that makes his conception of scientific/natural laws ambiguous.

The same tension between a rationalist and an empiricist standpoint was already evident in *Das Anwendungsproblem*:

[...] thus we can, as most radical empiricists, sum up [...]: all truths, without exception, are inductive, they can eventually be supported only by experience, may they be logical, mathematical, physical or psychological. (Zilsel 1916, 165)

If you are a philosopher, you have to be a rationalist. (Zilsel 1916, 169)

However, it must also be considered that Zilsel used the terms “induction” and “rationalist” in a quite peculiar way, as we will see in the next sections. In light of Zilsel’s own use of these terms, an epistemology based on induction and a rationalistic standpoint are not as contradictory as one may think – quite the contrary, as we shall see in Sect. 7.5.

7.4 The Induction of Causal Laws

In Zilsel’s *Das Anwendungsproblem*, causal laws rest on the same foundation as statistical laws and the law of large numbers: the validity of all of them can be deduced from the doctrine of universal diverseness. In Sect. 7.2, we considered Zilsel’s transcendental deduction of the law of large numbers and statistical laws; in this section, we shall move on to the transcendental deduction of the validity of causal laws.

Zilsel’s justification of the validity of causal laws develops through the concept of induction, which he defines as the “conclusion from what we know from experience to the unknown,” (Zilsel 1916, 78; my translation) but which he seems to conceive here mainly as the inference to causal laws. He affirms that he has found two necessary (but not sufficient³⁴) conditions of the possibility of induction, that is, two necessary conditions of the possibility of inferring causal laws.

³⁴After a long review of the most important attempts, in the history of philosophy, to justify the validity of induction, Zilsel affirms to have found only two necessary conditions of induction, but not the sufficient ones (Zilsel 1916, 99–100).

The first condition is the existence of partial causes (*Partialursachen*),³⁵ whereby for Zilsel every deterministic conjunction between events is in fact an instance of *partial* causation. In order to understand this, we should go back to Zilsel's logical system and his considerations about the relationship between intension and extension. In Zilsel's terms, a state of the world would be, with respect to the extension, an individual, and we know from the relation between intension and extension that it would have an almost infinite set of properties, that is, an almost infinite intension. Such an intension could hardly be known by a finite subject, and – furthermore – it could not exist twice (as the doctrine of universal diverseness states). Only if we restrict the number of properties under consideration to a smaller subset, states of the world that share this particular subset can appear repeatedly, which means that only if we look at a partial subset of properties of a state of the world, several states of the world can possess it. Only under this condition it is possible to say: “*Every time* a state of the world with the partial set of properties A appears, it is accompanied by a state of the world with a partial set of properties B.” In this way we would have identified a causal law, and this is also what Zilsel means with induction.³⁶

The second condition of possibility for induction is found by Zilsel in the aforementioned “theorem of radical decrease of intension.” This theorem implies that, with the increase of the observed things or events (extension), the properties they have in common (intension) should diminish, and also each of these properties should follow the tendency to not appear again. Assume we are interested in a particular property A. Correspondingly, we select all the individuals with this property A: we gain a kind of artificial set, artificial because “naturally” or “normally” the property A would tend to not come out repeatedly. Once we have determined this property, all other properties – in virtue of the mentioned theorem – should tend, in our artificial set, to not appear again. It is precisely for this reason, that, if we notice that in our set another property B is also always present, we can say that we have found a causal relation between A and B. For example,³⁷ from all possible events, we artificially select a class of events that share a common property: in each of these events a metal is heated. According to Zilsel's doctrine of diverseness, each of these events would tend to be different from the others with respect to all other properties. Let us assume that “the metal expands” is one of these other properties. For the theorem of the radical decrease of intension, this property should tend to not appear

³⁵ See Zilsel (1916), III, I, 3: “Partial causes as first necessary condition. Determinism and the law-like character of nature” (this is my translation of the title of the paragraph; I translate here “Naturgesetzhlichkeit” with “the lawlike character of nature” for lack of a better alternative).

³⁶ Interestingly, Zilsel severs the bond between causation and determinism. From his standpoint, it is precisely by getting rid of Laplacian determinism that we can infer (or – in the ontological parlance – discover) causal laws: “Now, it is clear that we would be in a very bad condition for predicting the future if we could only count on determinism: for example, if we would have to know – for predicting the rebound angle of a billiard ball – not only the angle of incidence, but also the entire state of the world, including the wind conditions in Borneo and the meteorites on Sirius” (Zilsel 1916, 102; my translation). On Zilsel and the question of scientific (in)determinism, see Romizi (2019), Ch. 7.

³⁷ In this case, I am the author of the example, not Zilsel.

repeatedly within our class of events. But, on the contrary, we would find out that in our class of events with the property “metal is heated,” the other property “the metal expands” is also always present. This exceptionality suggests us that there is a significant connection between the two properties. In other words, causal laws are identifiable and significant precisely because they are exceptions to a natural, universal tendency to change and diverseness.

With respect to the concept of causality, in *Das Anwendungsproblem*, we find exactly the same unsolved tension between a rationalist and an empiricist standpoint that characterizes Zilsel’s interpretation of probability. On the one hand, as we have seen, the rationalist Zilsel traces back causality to the relationship between intension and extension: in this context, he celebrates what he calls a “de-materialization of the cause” (*Entmaterialisierung der Ursache*³⁸) and he emphasizes that he conceives of cause and effect as being not things, but only logical properties. On the other hand, the empiricist Zilsel assures us that he does not want to confuse the concept of cause with that of reason, and he goes so far as to explain even deductive implications empirically, as instinctive acts.³⁹

As we have seen, Zilsel believes that what we call causes are always only partial causes. Every effect derives from a cause “plus” an almost infinite series of other conditions that we do not know and that could always turn out to restrain the validity of the law.⁴⁰ Zilsel calls the entirety of all these unknown conditions “the big unknown of the world” (*die große Weltunbekannte*), and conceives it as something that we can progressively reduce but never eliminate.⁴¹ In Zilsel’s words, this “big

³⁸Zilsel (1916), § 93. Among the consequences of substituting an empirical concept of causation with a purely logical one is the loss of the temporal asymmetry between cause and effect: here Zilsel considers it to be an advantage. This is coherent with the Machian conception of causation as a functional dependence that Zilsel supports in later writings: see especially Zilsel (1927a). However, in this article, Zilsel considers the issue of time-asymmetry more in detail and he offers a much more differentiated picture, which takes into consideration also irreversibility (e.g., in thermodynamics). On Zilsel’s conception of temporality and its implications for his views on historical and (other) natural processes, see Nemeth (2011), section II and pp. 8–9; Wulz (2011, 2012), section 4 (“The irreversibility of the material”).

³⁹See Zilsel (1916), 165–166.

⁴⁰In this respect, Zilsel clearly thinks that both rational order and empirical (contingent) data are needed in order for scientific laws to be applied (typically, for scientific prediction): in this sense, it can be said that for Zilsel the rational and the empirical component are complementary (the so-called “Zilsel’s thesis” could be seen as a “sociological version” of this tenet. See also Zilsel (2003²/1941a), 186). As he will state it many years later: “Astronomers can not predict from Newton’s law what the position of the planet Mars will be on the next New Year’s Eve. In addition to the law they need the knowledge of the positions, velocities, and masses of a few celestial bodies at some given time: they need knowledge of ‘initial conditions’ as the physicist puts it. Knowledge of a law, therefore, is not a sufficient but only a necessary condition of prediction. Evidently the same holds for history. Even if laws according to which wars between industrialized countries proceed were known, it might still be impossible to predict the outcome of the present war. Among other more intricate things we do not know is e.g. the number of airplanes on both sides.” (Zilsel 2003²/1941b, 200).

⁴¹On the open-ended character of knowledge entailed in Zilsel’s epistemology and in particular in his concept of “rationalization,” see Wulz (2011).

unknown” “will always persist as an *irrational* residual which can never be unraveled and which will always recede to a new darkness.” (Zilsel 1916, 120; my translation and my emphasis) Not surprisingly, this issue is also related, in Zilsel’s system, with his “doctrine of universal diverseness”:

we could trace back the universal diverseness to the imprecision, to the irrational character of the much too complicated single things. The law of large numbers and the universal diverseness are thus in some way strictly related to the Imprecise, to the Irrational and to the Unknown. (Zilsel 1916, 132; my translation)⁴²

Zilsel dedicates an entire chapter of his book to the antithesis rational/irrational and he argues conclusively: “The Rational is Determinacy, Precision itself [...] Thus I understand the fundamental antithesis of Determined/Undetermined as Rational/Irrational.” (Zilsel 1916, 150; my translation). Later in the text, he relates the inductive inference of causal relations with Determinacy and Rationality.⁴³

In this way Zilsel has built up, in *Das Anwendungsproblem*, a sort of dialectical system, in which it is precisely in virtue of the diverseness and of the disordered, irrational character of nature that we can obtain any kind of scientific law.⁴⁴ With respect to our main question about the epistemic or ontological conception of laws, it seems that we can interpret Zilsel as taking nature to be itself disordered and “irrational,” while *we* organize this material putting it in an order which will anyway never be complete. Thus, according to Zilsel, the order we find in nature would in fact be an order that *we* create. However, the question becomes even more complicated as Zilsel uses the terms “rationalism” and “rationalization” also in a sense that

⁴²The concept of an “irrational residual” as related to individuality (“the much too complicated single things”) was present and discussed within the “Southwestern school” of Neo-Kantianism. Heinrich Rickert and Wilhelm Windelband, for example, deal with the irrational and not entirely explainable character of the individual in the context of their reflection about the difference between natural sciences and humanistic disciplines (cf. Rickert 2007/1896–1902, I, 231ff. and Windelband 1915⁵, 159–160). Emil Lask criticizes this conception and ascribes the irrational character rather to everything that involves intuition (*Anschauung*) and sensibility: only purely logical and categorical forms would be entirely rational (cf. Lask 1923/1910, 76–79, where the terminology and some concepts are quite similar to Zilsel’s ones). Probably Zilsel was acquainted with this literature, which was very influential at that time, although he does not refer to it explicitly in this respect (there is only an explicit reference to Windelband in Zilsel 1916, 17, footnote 1 – but it concerns a different issue), and although he certainly refused some main tenets of Neo-Kantianism (see also Zilsel’s criticism of Neo-Kantianism in his later political writings (Zilsel (1992/1931a, 1992/1931b), where this criticism is related to Max Adler’s reception of it).

⁴³See Zilsel (1916), 166.

⁴⁴In some later writings, Zilsel deepens and applies his theory in various ways. In an article published in 1921 in the *Monatshefte für Mathematik und Physik*, Zilsel tries to give a new foundation to statistical mechanics, and in particular to irreversibility, by means of what he calls *Allagodenhypothese*. This original term comes from the ancient Greek word *allaghé*, which means “change,” “variety,” and it is not difficult to recognize here the doctrine of universal diverseness. Referring to physical systems, Zilsel writes: “We ascribe to the system a kind of need for change” (1921, 148; my translation). Still in 1928, in his *Naturphilosophie*, Zilsel talks about “lack of order” (*Unordnung*) as a character of nature, which alone makes possible any knowledge of it (1928, 118–19). More than ten years after the publication of *Das Anwendungsproblem*, we find here almost the same arguments.

goes beyond the usual, epistemological one, and which is not opposed, but rather essentially related to the empirical search for laws – as we will see in the next section.

7.5 Zilsel’s “Rationalization” and the Political Dimension of the Search for Laws

“If you are a philosopher, you have to be a rationalist.”⁴⁵

“The Rational is not something given, but a task.”⁴⁶

“We should not speak of the Rational, but rather of the Rationalization.”⁴⁷

“[The Rationalists] did not allow themselves to surrender the Rational, the standards of Philosophy, to the enemy.”⁴⁸

By the end of *Das Anwendungsproblem*, the reader must notice that in the course of Zilsel’s book a shift has occurred: while in the first part of the book Zilsel seemed to embrace a rationalist standpoint in the classical, epistemological meaning of “rationalism” (e.g., through his reference to Leibniz and Spinoza and through his use of logic), in the last part of the book he speaks of rationalism and rationalization almost with a missionary tone. Here, Zilsel declares himself to be a rationalist in a peculiar sense, which begins to show ethical-political connotations⁴⁹ and which is perfectly compatible with an empiricist standpoint. As we have seen at the end of the previous section, the concept of “rationalization” as developed by Zilsel in *Das Anwendungsproblem* basically means two things: (1) the pursuit of determinacy and precision and (2) the inductive inference of causal relations. In *this* sense, Zilsel is perfectly coherent in being both a “rationalist” and a supporter of induction.

Zilsel’s pursuit of “rationalization” as a political task will become more and more evident in his works following *Das Anwendungsproblem*. Both his books on the concept

⁴⁵Zilsel 1916, 169; my translation.

⁴⁶Zilsel 1916, 157; my translation. Zilsel’s original sentence is difficult to render in English: *Das Rationale ist nicht gegeben, sondern aufgegeben*. In this case, an implicit reference to Neo-Kantianism (this time the Marburg School) is quite certain, since Paul Natorp had expressed almost the same concept in the same terms in his very renowned talk and text “Kant und die Marburger Schule” (Natorp 2015/1912).

⁴⁷Zilsel 1916, 157; my translation.

⁴⁸Zilsel (1916), 152; my translation.

⁴⁹Still, I do not agree with Schlaudt (2018, 279) when he writes: “[...] although Zilsel only quotes Leibniz when explaining the idea of rationalization in his PhD thesis, nevertheless there is an implicit reference to the famous passage in the third volume of *Capital*, where Marx [...] hints at the ‘rationalization’ of man’s ‘interchange’ with nature as a collective path from necessity to freedom.” Zilsel’s concept of “rationalization” in *Das Anwendungsproblem* seems to me to be quite different from Marx’s one (as it is clear from my reconstruction), and I see no reason to speculate about such an “implicit reference.” More plausible is Schlaudt’s suggestion if referred to Zilsel’s later writings, where the concept of “rationalization” is put in historical perspective and related to the rise of modern science and technology.

of “genius” (Zisel 1990/1918, 1972/1926) – even if different from each other in important respects⁵⁰ – are meant to deconstruct the “metaphysic of genius” (1) through a careful logical analysis of its “dogmata” (rationalization as pursuit of precision) and (2) through the search for causal relations between them and specific psychological or sociological conditions (rationalization as inductive inference of causal relations).⁵¹ The political purpose of this research program was to oppose the kind of irrationalistic metaphysics and the values of the conservative, nationalistic, and antisemitic political movements of that time.⁵² Its epistemological, methodological tenet was Zisel’s belief in the possibility of finding (non-deterministic) causal laws also in the socio-historical realm: a tenet he shared with his “fellow” Marxists,⁵³ but with some important qualifications. As we have seen, Zisel’s conception of scientific laws was (1) non-deterministic,⁵⁴ (2)

⁵⁰ See Nemeth (1997), 157–158.

⁵¹ More on this topic in Romizi (2019), § 7d. See also Nemeth (1997).

⁵² The cult of the genius was supported by antidemocratic, right-wing authors like Oswald Spengler, Houston Stewart Chamberlain, Othmar Spann, Carl Schmitt and others that Armin Mohler considered to be representatives of a “conservative revolution” (see Reisinger in this volume and Reisinger 2013, §3.1, where she offers a praiseworthy critical discussion of Dvořák’s (1981) political contextualization of Zisel’s work). Zisel believed that the other side of the veneration of few special personalities is the contempt for other human beings, and he explicitly wanted to oppose an “impure metaphysics of personality, of culture, of State, of Nation, of war [...]” (Zisel 1990/1918, 213; my translation).

⁵³ Even if he was a member of the Austrian Social Democratic Party since 1918, Zisel showed towards the Party and his fellow Marxists the same intellectual independence he showed towards the Vienna Circle. Nicholas Jardine (2003, 86–87) seems to see Zisel’s independence of thought as a source of confusion: “[...] for me, at least, the primary problem in coming to terms with Zisel’s writing is the uncertainty of his standpoint. He is a self-declared Marxist and materialist but with a host of qualifications which add up to an apparent rejection of central tenets of Marxism and dialectical materialism; he is associated with the Vienna Circle while arguing forcefully against its program of reconstruction and unification of the sciences; he takes up Kantian positions but voices scorn for neo-Kantians; and so on.” On the relationship between Zisel’s philosophy and Marxism (or scientific socialism or historical materialism, see: Dvořák (1981), Ch. 6; Wulz (2011), 305–309, (2012); Nemeth (2011); Schlaudt (2018) – however, I disagree with this latter in important respects, as my remarks in this paper make clear.

⁵⁴ Zisel (1992/1929, 42–43) explicitly protests against the adoption, by some Marxists, of “the two thousand year old fatalistic misconception of determinism” (my translation). The difference between Zisel’s standpoint and that of other Marxists in this respect can be noticed in Lukács’s review of Zisel’s *Die Entstehung des Geniebegriffes* (The Origins of the Concept of Genius): Lukács criticizes the fact that here Zisel only shows general structural correlations and nothing having the logical form of a law, namely nothing endowed with necessity (Lukács, quoted in: Maus (1972), VI–VII). As we have seen above, *Das Anwendungsproblem* may be considered a clear and original example of “Vienna indeterminism” or probabilism (Stöltzner 1999, 2003; Coen 2002, 2007), as I have argued more in detail in Romizi (2019, Ch. 7). This turns out to be a much better starting point than the deterministic one for arguing in favor of the historico-materialistic belief in the nomological nature of historical and social phenomena. Zisel explicitly uses his statistical conception of scientific laws as an argument against the idea of a difference in principle between natural and social sciences: since scientific laws and causation are *necessarily and in any case* only partial and statistical, they can be formulated also for domains in which the degree of certainty, precision and determinacy is lower than, for example, in physics (see e.g., Zisel 1972/1926, 321, 1930a, 411, 2003²/1941a, 195, 2003³/1941b). Interestingly, and notwithstanding

non-mechanistic,⁵⁵ and (3) non-materialistic.⁵⁶ Furthermore, (4) he did not think of causal relationships to be always asymmetrical (like the relationship base-superstructure)⁵⁷ and (5) his belief in the causal nature of historical and social phenomena was not dogmatic.⁵⁸

In three political articles (Zilsel 1930a, 1992/1932d, 1992/1933) published between 1930 and 1933 in the leftist journal *Der Kampf*, Zilsel denounces with high apprehension the diffusion of irrationalistic, anti-causal currents,⁵⁹ and affirms the search for causal laws as the essential character of a *Weltanschauung* to fight for. Not surprisingly, Zilsel denotes this scientific *and* political purpose with the term “rationalization.”⁶⁰

Should we take this term as suggesting that Zilsel, in his search for causal laws, had a purely epistemic conception of them? It does not seem so. In the Viennese years following the publication of *Das Anwendungsproblem*, Zilsel rather seems to lose quite completely his inclination towards rationalism in the classical philosophical (epistemological) meaning, and his Kantian tendency seems to disappear as well.⁶¹ His work on the concept of “genius” shows an authentic effort to *find out*

the aforementioned differences in the conceptions of the unity of science, exactly the same line of argument was put forward by Philipp Frank (e.g., 1932, 204–209) and Otto Neurath (e.g., 1981/1936, 776). A further, very interesting and original aspect of Zilsel’s indeterminism is his concept of “mneme,” meaning the inexact repetition of the past in the present (see Wulz 2012, section 3, “Menemonic functions”). In his last writings, Zilsel still argues against determinism (e.g., Zilsel 2003²/1941a, 178). In sum, there is quite a lot of evidence against Schlaudt’s claim according to which a main characteristic “of Zilsel’s account of laws is an all-embracing determinism” (Schlaudt 2018, 273).

⁵⁵ See Zilsel (1932b), and still in his “American writings”: Zilsel (2003²/1941a), 179 and §4.

⁵⁶ See his Machian conception of scientific laws as functions in Zilsel (1927a). With respect to *historical* materialism, Zilsel’s standpoint is analyzed by Nemeth (2011, see esp. sections II and IV) and Wulz (2012). Extremely interesting is the kind of voluntaristic interpretation that Monika Wulz gives of Zilsel’s materialism: “The concepts of *materialism* and *material* took a *practical* turn in his account of materialistic historiography: He thus understood the label materialism as a *decision* and a *demand*” (Wulz 2012, 101).

⁵⁷ See Zilsel (1927a), 286.

⁵⁸ See Zilsel (1927a), 286 and Zilsel (1992/1931b, 214).

⁵⁹ Zilsel (1930a) offers a very detailed description of all philosophical currents he labels as “irrational” and “anti-causal,” ranging from neovitalism (Driesch) to metaphysics of history and society (e.g., Troeltsch and Spann), from anthroposophy and theosophy to indeterministic interpretations of quantum physics.

⁶⁰ See for example Zilsel (1992/1929), p. 33, where he defines the (modern) “harbinger of the new, worldly-rational spirit” as being the “harbinger of the spirit of causal inquiry” (my translation). See also Zilsel (1930a), 416: “The highest goal of the scientific pursuit of rationalization [*Rationalisierungsarbeit*] is always the relationship ‘if...then...’” (my translation).

⁶¹ His criticism towards Max Adler in Zilsel (1992/1931a) can be seen as a summary (*post hoc*) of this development: here Zilsel charges the Neokantian Adler of excessively dwelling upon an abstract and metaphysical theory of knowledge; this should be replaced – in Zilsel’s eyes – with more concrete empirical research (see e.g., p. 79; as we have seen above, a similar criticism will be directed by Zilsel also against Neurath a year later in his review of Neurath’s *Empirische Soziologie* (Zilsel 1992/1932c).

laws in order to be able to *empirically* show their existence. In a letter to Moritz Schlick, Zisel explains his research program in 1924 as follows:

Following up my philosophical and physical works on chance and mass phenomena in inanimate nature, my interest in the last years was directed especially towards the application of the methods of natural sciences to some domains of the human sciences [*geisteswissenschaftliche Gebiete*], as well as towards the discovery [*Aufdeckung*] of, to some extent, exact laws ruling events in this domain [*Gesetze des geisteswissenschaftlichen Geschehens*].⁶²

It seems clear that Zisel believes in the real existence of laws (ruling both the natural and the human domain) to be *discovered* and intends to dedicate his further work to empirical research. This turn in Zisel's work has been perfectly synthesized by Elisabeth Nemeth with the expression: "transposition of philosophy into empirical research."⁶³ The new predominance of an empiricist standpoint will appear clearly in Zisel's contribution to the *International Encyclopedia of Unified Science*: "Problems of Empiricism" (Zisel 2003/1941a).

However, the next object (after the concept of genius) of Zisel's empirical research will be science itself, and this gives, again, an epistemic twist to Zisel's conception of scientific laws. In an article published in 1929 in *Der Kampf* with the quite dry title "Philosophical Remarks," Zisel analyzes the historical development of philosophy and the empirical sciences from a sociological point of view, tracing back their origins, evolution, and mutual relationships to the respective social and economical conditions. In this article one can already clearly see the early phase of the sociological work that will lead to Zisel's "American writings." The concept of scientific law undergoes here an epistemic twist insofar as the sociological perspective lets laws appear not so much as facts, but rather as one of the possible, contingent ways of dealing with "facts" [*Tatsachen*]:

At a first glance [...], the knowledge [*Erkenntnis*] of the mathematical formula according to which a stone falls seems to be very independent from social conditions; however, whether one considers the fall under a scientific or a magical perspective, whether the theoreticians deal with stones or rather with angels and souls, whether one is interested in the end, in the "natural place" of the falling stone or rather investigates its path and the duration of its fall by measuring them, whether one solves the problem by looking in old books and making subtle comparisons among the opinion of the authorities or rather by pursuing autonomously experiments and calculations [...]: all this depends on the way in which people deal with economy [*wie die Menschen wirtschaften*], whether they live in cities, whether they are acquainted with money; it depends on the reputation that manual workers have managed to acquire and on the role of machines and governmental laws. (Zisel 1992/1929, 41–42; my translation)

⁶²Quoted in: Dvořák (1981), 10; my translation. Zisel wrote this letter to Moritz Schlick after his later work on the concept of genius had been rejected as *Habilitationsschrift* (for obtaining the *venia legendi*). On this decisive episode in Zisel's biography, see Dvořák (1981), 20–22, Stadler (2015), §9.1.7., and Taschwer in the present volume.

⁶³Nemeth (1997, 158). Nemeth sees Zisel's "transposition" as an early example of naturalized epistemology.

This sociological perspective on science and scientific laws implies a kind of relativization of their validity – which of course does not mean a denial of their validity *tout court* or of their ontological grasp.⁶⁴ However, Zilsel’s perspective on scientific laws here is different from the one he adopts in his empirical *search for laws*: it is a meta-perspective on the concept of scientific laws, which points to their epistemic character. Again, laws appear to be products of reason: not of a universal reason anymore (as it was in *Das Anwendungsproblem*), but of a socially conditioned reason.

7.6 Epilogue

Forced to leave Vienna in 1938,⁶⁵ Zilsel brought two research projects to his American exile:⁶⁶ on the one hand, a philosophical project on the concept of law, which should have argued – among other things – for the existence of laws also in the historico-sociological domain; on the other hand, a different project on the social origins of modern science, in which Zilsel searches for “nomological correlations”⁶⁷ between the emergence of modern science and specific social conditions. This last project also included a sociological explanation of the genesis of the concept of law. We see here Zilsel’s double perspective on laws at work: he looks for historical-sociological laws as being something real (ontological conception of laws), but he also deconstructs the same concept of law by showing its nature as a historical-sociological “product” (epistemic conception of laws). Lenhard and Krohn present these intertwined perspectives as a kind of circularity:

⁶⁴After the last quoted passage, Zilsel points out that also the philosophical work is conditioned by the social context in which it is pursued. However, from Zilsel’s perspective, this does not affect the validity of philosophical work: Zilsel argues that philosophers should continue to deal with problems philosophically, letting other people, in the future, inquire into the question about how the social context conditioned their philosophical work. A relinquishment of philosophy, Zilsel says, would be just as socially conditioned as new philosophical theories (see Zilsel (1992/1929), 42).

⁶⁵For biographical information about Edgar Zilsel, see: Dvořák (1981), Stadler (2015), §9.1.7 and 494–495, Raven and Krohn (2003) and Fleck (2015). Zilsel’s son Paul gives a touching account of Edgar Zilsel’s condition in exile (Paul Zilsel 1988).

⁶⁶See Raven and Krohn (2003), in particular p. xxvii. Zilsel’s “American writings” are edited by Raven and Krohn in Zilsel (2003) along the lines of the two projects.

⁶⁷It seems to be appropriate to use a prudent terminology here. Referring to Zilsel’s *Die Entstehung des Geniebegriffes*, Nemeth (2011, 9–10) points out: “Note that Zilsel here speaks, on the one hand, of ‘historical causes’ which effect social transformations and, on the other hand, of certain ideas and developments being ‘lawfully connected’ with them. [...] By contrast, Zilsel is much more careful when it comes to the relation between those ‘transformations’ and the ‘ideas’ connected with them. The question of what kind of lawful connection is at issue is left open. This does not mean, however, that Zilsel did not suspect causal relations to be involved. [...] As for physicists, so for historians the task consists in discovering functional relations and to establish what kind of lawful relations obtain.”

On the one hand, the acknowledgment of laws depends on historical and social conditions, while, on the other hand, the analysis of these conditions presupposes the notion of law.⁶⁸

In light of Zilsel's "Viennese" work as I described it in the previous sections, this kind of circularity appears to be a natural development of a tension which was present in Zilsel's work from the beginning: the tension between an epistemic and an ontological conception of scientific laws. This tension, in turn, originated from an oscillation between a rationalistic and an empiricist standpoint, which is very characteristic of Zilsel's early works and tends to disappear as Zilsel's preference for a rationalistic standpoint shifts from an epistemological to a political conception of what it means to be a "rationalist."

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⁶⁸Lenhard and Krohn, "The Law of Large Numbers. Edgar Zilsel's Attempt at the Foundation of Physical and Socio-historical Laws", in this volume, p.124.

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