

# THE UTOPIA OF UNIFIED SCIENCE: THE POLITICAL STRUGGLE OF OTTO NEURATH AND THE VIENNA CIRCLE

IVAN FERREIRA DA CUNHA

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**Abstract.** Neurath's approach to the problem of the unity of science is different from conceptions we may call traditional, to know, those that consider that what unites in one single concept the diverse sciences is the adoption of a method, or those that defend that this is carried through by certain characteristics which can be found in the body of knowledge considered scientific. Neurath's stance also diverges from the standpoint that there is no unifying factor for science, that is, the view that the different sciences are only classified under such concept because of the historical origin of such activities. Neurath's proposal is to consider science as an attitude, a posture in relation to the problems of the world, the scientific world-conception. This text presents such approach in connection to the aspect of social transformation that can be found in Neurath's thought. This is done following a comprehension of the ideas of the Vienna Circle, seeking to understand a continuity among the ideas of the members of such group, especially Neurath and Carnap. The present text aims, as well, at recovering the Neurathian idea that we can use a philosophical approach to science to struggle against the problems of the world.

**Keywords:** Unity of science; Neurath; Vienna Circle; philosophy of social sciences; encyclopedism.

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## 1. Introduction: the Vienna Circle, Carnap and Neurath

This text aims at discussing Neurath's approach to the problem of the unity of science. Such problem has to do with how the multiplicity of things called "sciences" can be understood under a single concept. In other words, it is the inquiry over what all forms of scientific knowledge have in common, or the question about what science is.

There are three usual answers to the problem of the unity of science. The first is that science is what is produced by certain method, the scientific method. The second is that science is a body of knowledge with certain features, such as an origin in experience, or a logical entanglement of its parts, or the propriety of explaining the world. The third is the defense that science is a collection of diverse activities with no significant resemblances among each other, except that they share a historic origin, namely, the natural philosophy from the 16th and the 17th centuries.

The third conception poses many serious challenges to the other ones. However this third conception seems to be a rather incomplete provisional answer that rests

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on the idea that science is what scientific communities do. This is unsatisfactory since it sounds like we are not looking for the uniting factors in the right place.<sup>1</sup>

In the present paper, I am going to show another conception for the unity of science: that which considers science as an attitude, as a way to look at the world. Such idea was adopted in the 20th Century by the group of philosophers and scientists known as the Vienna Circle.

We are going to discuss the ideas of such group, but it must be clear that it is difficult (if not impossible) to find a coherent system of such ideas, since Vienna Circle has always been marked by internal controversies. Such controversies happened even between Carnap and Neurath, who were the members with most similar ideas.<sup>2</sup> The undeniable fact, however, is that there was a piece of work written jointly by three representatives of the Circle (and agreed to some extent by the others). And in that text the different points of view of the Vienna Circle are supposed to meet in the same page. That text is known as the manifesto of the Vienna Circle. It came out in 1929 with the title *Wissenschaftliche Weltauffassung: der Wiener Kreis*.<sup>3</sup> Therefore, one can talk about “the Vienna Circle”, as long as one follows the *Manifest*; the ideas of the Vienna Circle, hence, are the ideas presented in the *Manifest*. This is the approach we are going to make here, as we seek to understand Carnap’s and Neurath’s stances as part of the ideal of the Vienna Circle.

In the *Manifest* the Vienna Circle states that there is a scientific attitude, the scientific world-conception, characterized by the principle that there is no inaccessible knowledge, no unsolvable riddles, no unfathomable depths, as can be found in theological and metaphysical standpoints. Such scientific attitude towards the world should be taught and enforced to all people, in order to improve educational systems and life quality in general, since it defends the human capacity of solving problems with no recourse to any kind of magical thought, and without proposing that we should faithfully resign face the adversities the world presents us (Hahn, Neurath and Carnap 1929[1973], p.304–10).

In the *Manifest* the Vienna Circle also talks about the body of knowledge produced by the scientific world-conception, and the turning point of such group is that they deal with such body of knowledge by using symbolic logic tools, which allow one to understand the connections among scientific concepts. This part of the proposal was developed mainly by Rudolf Carnap, the most well-known member of the Vienna Circle, by means of the construction of a logical system in which all science objects (concepts and events alike) are to be related to objects from the elementary experience of an individual. Hence Carnap proposed a syntax that formulates all statements of science, demarcating it from metaphysics.<sup>4</sup>

The criticism to metaphysics is that it aims chiefly at the expression of feelings about certain things, making statements that don’t fit the form proposed by Carnap. The aim of expressing feelings is very important, but metaphysics is not the adequate

medium for that: in the *Manifest* the Vienna Circle contends that such task should be carried through by art, and not by theorizations that intend to be knowledge (Hahn, Neurath and Carnap 1929[1973] p.307). Some years later Carnap would say that metaphysicians are musicians with no musical ability — since they can't handle any musical instrument they turn into pretense theoretical research (Carnap 1932b[1959], p.73–80).

This is probably the most famous claim made by the Vienna Circle, and it fits into the second kind of answer to the problem of the unity of science — that which sees science as a body of knowledge. However in the *Manifest* one can easily notice that Vienna Circle proposes science to be united as an attitude, a world-conception. So, let's examine the works of Otto Neurath for a better comprehension of this position, and for understanding how it articulates with Carnap's proposals in the Vienna Circle project.

## 2. Neurath's social utopias

Neurath was a social scientist and economist,<sup>5</sup> and he had already worked on many economic, historic and social matters in early 20th Century, before World War I. During the war he also developed some models for economy, and in the reconstruction period he was nominated a director of a central planning office in the German state of Bavaria. His office aimed at distributing goods and work force in order to meet the demands of the different social classes of that state: miners, farmers, industrials, tradespeople etc. He had quite a success for a while, but in 1919 a communist revolution broke in Bavaria. The revolutionaries were sympathetic to Neurath's work and allowed him to go on, but soon afterwards the revolution was violently repressed — and Neurath was considered a traitor, he was then arrested, tried, and deported back to Austria.<sup>6</sup>

While working in this kind of project, Neurath advanced his view on the social sciences. His idea is that the social scientist must create utopias, *i.e.*, models of society, abstractions as to how a group of people might organize and work. This involves the elaboration, for instance, of arrangements of social organization, projects for urbanization and habitation, models for the distribution of goods, and even standards of lifestyle. Such utopias would serve to inform the government and ordinary people about possibilities for life. Politicians would be like engineers, technologists that apply the utopias, the theoretical models developed by social scientists, to concrete situations in people's lives, proposing alternatives in society.<sup>7</sup> In the 1920's Neurath was able to apply his proposals in a urbanization project that aimed at eliminating slums in Vienna.

It is very important to remark that this is not a traditional technocratic concep-

tion of social engineering, in which the government determines the function of each people in a society, according to some so-called correct scientific theory. Neurath's proposal is that each one of the persons involved must be informed about the many possibilities foreseen by the social scientists, the manifold of utopias available at the moment of application. Also, the people must take part on the decisions, and even on the elaboration of utopias. People's lives would not therefore be altered simply by a decree: Neurath's conception implies that people are free to build their own lifestyles, their own economic systems, or any other thing planned for certain group. And such freedom is to be enhanced by scientific knowledge.

The technocrat view of social engineering is a form of what Neurath calls pseudorationalism, the idea that reason can furnish proposals that are absolutely correct and universally valid. Neurath criticizes this position in many texts<sup>8</sup> by saying that it is an absurd pretension to suppose that any scientific theory, philosophical or artistic view, or political solution — in short, any rational product — is to be correct in every case, valid for every person and every situation, infallible, and that it takes into account every aspect of something. In Neurath's view, even though humankind, by means of science, has powers to change and improve the world, it is not going to happen at once, as in a magic trick. Likewise, no solution is complete and absolute, some problems always remain, just as new challenges are created. Pseudorationalism in social science and engineering appears in the form of projects based on some theory as to how society must be organized, which are presented and applied by governments without broad debate with the involved community: good social engineering must be able to present to the population without formal instruction how certain project will be good or bad in short, medium, and long terms. It also must be able to receive and discuss counterproposals made by such population.

The aspect that interests us is that Neurath considered that this kind of work was one of the main advantages that the broad dissemination of the scientific world-conception could bring; he used a scientific method of solving problems in analyzing the requirements of the people with whom he dealt, instead of merely applying a fixed model of "good living", or of "well distributed goods". The idea was to analyze each problem under the light of the largest number of possible solutions, aiming at enhancing the well-being of the humans that receive the product of science.

Another matter that must be mentioned is the importance of communication in Neurath's proposals. If the utopias are to be known by every person involved in the application of a certain project, then it is necessary that such models are presented in terms that allow the broadest comprehension. Two projects advanced by Neurath stem from this idea: ISOTYPE, a visual language to present complicated statistical data;<sup>9</sup> and physicalism, the idea that it must be possible to elaborate all scientific production in terms of the objects surrounding us. Even if it is not possible to talk about electrons and societies in palpable terms, somehow such knowledge turns out

to things: a led that lights up, or a playground built in the neighborhood. This kind of object is understandable by everyone, without complicated special instruction. Physicalism, therefore, is not about reducing all sciences to physics: it is concerned with the educational aim of disseminating scientific knowledge and improving society.

### 3. Unified science and the Encyclopedia

As Nemeth points out (1982[1991], p.290-2), one of the utopias Neurath set forth is the so-called unified science, a project presented in the *Manifest* as the great goal of Vienna Circle (Hahn, Neurath and Carnap 1929, p.306). The physicalist language would make possible the cooperation and communication among scientists from the most diverse fields; and even more than that, not only among scientists, but among all people, since science affects the lives of everybody. This is what Neurath called the universal jargon, or universal slang. Such language must be logically articulated in order to be easily understood and so that it is as free of ambiguity as possible. Nevertheless, we must take into account that Neurath had no illusions as to generating an absolutely precise and completely ambiguity-free language: he planned a language which gets more and more refined in a continuous and infinite process (Neurath 1937[1983], p.172–4).

Carnap's proposal, which I talked about in the beginning of this text as the most famous item in the Vienna Circle showcase, had the objective of establishing the physicalistic language for unified science. Carnap proposed the concept "thing-language",<sup>10</sup> a language that contains only everyday life objects to which all concepts of science should be able to be related. The idea is that each branch of science has its own technical and specific dialect, but such jargon should relate somehow to the objects around us. Each special science has therefore its own laws establishing relations inside its own ontological sphere; the relation to physical objects happens by means of an extension to the thing-language, independently of scientific laws.<sup>11</sup>

Just like the other social projects advanced by Neurath, unified science should be built by all those who share the scientific attitude, the scientific world-conception, from all branches of science, of art, of common life, creating a plurality of views of science. Unity of science is taken into effect therefore in the union of the people who share a kind of world-view, the stance that science can help us solve our problems. Such union is carried through by means of the coordination, or, in better words, the orchestration of the different areas of science.<sup>12</sup>

An important feature of Neurath's proposal for the union of scientific world-conception is pluralism. The world-view of each of the persons and groups is not, and should not be, identical. Neurath says that science itself is constituted like that, in each of its specific branches. Statements about observables, for example, are con-

ceived by Neurath as a complex of concepts which are not simply absorbed by sense organs: there are sensory elements, but also cultural, historic, and social elements alike in the observational statements. These are therefore neither simple nor primitive in the common philosophical sense; and each scientific community reaches conventions as to what is observable, just as to what is acceptable. Neurath's pluralism keeps away the phantoms of a super-science that intends to legislate over all human knowledge and of an all-inclusive metaphysics: unified science is the construction of bridges among sciences, keeping up with the individuality of each area (Neurath 1937[1983], p.172–4).

This exposition may throw a different light on the famous Neurath's ship illustration, which says that "we are like sailors who must rebuild their ship on the open sea, without ever being able to dismantle it in dry-dock and reconstruct it there from the best components" (Neurath 1932-3[1983], p.92).<sup>13</sup> The idea is that science is just like any other part of life: it is not possible to stop and withdraw to a safe fixed place for planing a general renovation, or a reconstruction out of nothing. This illustration shows the opposition Neurath established against the philosophical strategy of elaborating a "system", *i.e.*, the attempt to build knowledge as a uniform whole. Such strategies usually seek a solid and indubitable basis to justify all knowledge thoroughly. Neurath opposes to systems like those of Descartes and Kant, that failed to notice our condition of sailors in the open sea: they had the illusion of finding a dry-dock, apart from any social and cultural context.

The pretension of elaborating a "system" that comprehends the whole of human enterprise is a form of pseudorationalism. We cannot find a final answer, absolutely correct, for all our problems, in a philosophical *deus ex machina*. We must keep sailing on with the best we have at hand.

In spite of such situation, we can create devices to guide the reconstruction of our ship, artifacts that might make the construction end up differently. Neurath advanced one of these with the *International Encyclopedia of Unified Science*,<sup>14</sup> a project presented in the thirties and developed along the three following decades. It aimed at bringing to life the utopia of unified science, in which all people that share the scientific world-conception unite and communicate about their productions and their views of the world. Such cooperation would create a series of works, the *Encyclopedia* itself, that would serve as a source of reference and learning about the scientific way of looking at the world and of solving problems. Science was to be shown in the *Encyclopedia* as a mosaic, a collection of irregular pieces, different from one another, but due to its organization, it generates an image when observed from some distance.<sup>15</sup>

#### 4. Concluding remarks

I opened this paper with a characterization of the ideals of the Vienna Circle as a struggle to enforce a scientific world-conception in opposition to metaphysical or theological points of view. In such characterization, the proposals of the Vienna Circle serve very well to Neurath's political aims, as it integrates his utopias with other Vienna Circle members elaborations, such as Carnap's physicalism and logical systems. When one reads Neurath's or Carnap's works from the period focused here, one faces the risk of forgetting that they were part of a group, so that there should be an interconnection of all they were saying. As I pointed out, such interconnection is not to be perfect as the Vienna Circle was not a homogeneous group — on the contrary, polemic was one of their main features.

Therefore, one must ask, after realizing all this political aspect of the Vienna Circle thought, what was their political struggle — or, if Neurath was the most political among them, towards what was he struggling? In the *Manifest* the Vienna Circle affirms that the problem they rise against is the strengthening of a metaphysical and theological tendency, both in common life and in the scholar environment (Hahn, Neurath and Carnap 1929, p.301–4). And the Vienna Circle would react against that by putting forward projects that would make science more present in life, initiatives that would bring a better understanding of science to the world.

As I sought to present, Neurath's (and Vienna Circle's) view of unified science as an attitude towards the world is largely humanistic: the scientific attitude, the unifying bond of all science, is a stance towards the world that considers nothing to be *a priori* impossible for the human being — no unsolvable problems and no inaccessible knowledge. Neurath nevertheless doesn't grant any kind of mystic omnipotence to humankind, since according to him knowledge is a natural phenomenon which cannot be built in an ideal manner, in a perfect system. Science is therefore the path for solving problems, but it is made erratically, fallibly. Following Neurath's ship metaphor, the reconstruction of the ship is exclusively and completely within our reach, but we cannot disassemble it piece by piece in a shipyard so that the rebuilding is carried through as good as we can imagine. We must go on endlessly sailing in open sea.

We have seen, as well, that Neurath names as utopias the abstract models in the humanities. Philosophy of science can, as any human endeavor, propose situations to be aimed at, in utopian fashion — Neurath was doing it when he proposed the *Encyclopedia*. When the *Encyclopedia's* first number came out, in 1938, it seems that it was already too late, at least for that generation: instead of looking for a scientific (*i.e.* fallible, humanistic, pluralist, transparent, comprehensive etc.) way of solving problems, Europe had taken a pseudorationalist shortcut through totalitarianism.

At this juncture, a common criticism to Neurath's encyclopedic project — and to

Vienna Circle's project as well — is that it became outdated. Traditional philosophy of science has been supposedly replaced by the “science studies”, a postmodernist contextual approach that presents itself in the form of many disciplines, such as sociology of science, anthropology of science, just as other studies that focus on specific branches of science.<sup>16</sup> Defendants of this area often say that there is no science as a unified whole and that Neurath's political utopia is pointless, since it is a device to fight against totalitarianism and its obscurantist persecution.<sup>17</sup> Science studies on the other hand fights the political homogenization, since it focus on the diversity of scientific thought and in the independence of scientific communities — this is supposed to be a more relevant struggle.

A Neurathian response must first of all claim that if there is an environment for such ideas, it was created by the *Encyclopedia*. We must remember that Kuhn's *Structure of Scientific Revolutions* was the second number of volume two in that work. The *Encyclopedia* really united people who were interested in thinking about science, and those people communicated and cooperated in such a way that they created a new way of studying science. Now as to the political part of the criticism, it may be true that totalitarianism is not anymore the enemy as it was in the 1930's. But neither would be the danger of homogenization of thought. The world is no longer polarized between capitalism and communism as it was during the cold war — also, the world is not tending towards any of them, as it seemed to be in the nineties. And therefore the aim of making science diverse enough to stand up against such polarization does not hold any longer. We don't have to fear anymore the risk of having only one way of thinking.

One could argue that both totalitarianism and homogeneous thought are still huge problems of the current world, and it is reasonable to agree with that. However, we must notice that such enemies are showing up in a different fashion. This difference of presentation entails a difference in the understanding of the problem.

Finally, we see that Neurath and the Vienna Circle were struggling against totalitarianism with a portrait of science as an unified whole. The representatives of the postmodernist approach sought to fight the risk of homogeneous thought with an image of science as a diverse and plural endeavor. Thus, the question that remains has to do with what kind of picture of science we need in order to fight the problems of today. So, what portrait of science would contribute to, in the *Manifest* phrasing, our *life of the present*?<sup>18</sup> And what kind of problem could we fight? Of course, these are complicated questions much beyond the scope of this paper.<sup>19</sup>

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IVAN FERREIRA DA CUNHA  
 Núcleo de Epistemologia e Lógica, NEL / CNPq  
 Departamento de Filosofia  
 Centro de Filosofia e Ciência Humanas, CFH  
 Universidade Federal de Santa Catarina  
 88010-970 Florianópolis, SC  
 BRASIL  
 clockwork.ivan@gmail.com

**Resumo.** A abordagem de Neurath ao problema da unidade da ciência é diferente de concepções que podemos chamar de tradicionais, a saber, aquelas que consideram que o que une em um único conceito as diversas ciências é a adoção de um método, ou aquelas que defendem que isso é feito por certas características encontradas no corpo de conhecimentos considerado científico. A posição de Neurath também diverge do ponto de vista de que não há um fator unificador para a ciência, isto é, a visão de que as diferentes ciências só são classificadas sob tal conceito devido à origem histórica de tais atividades. A proposta de Neurath é considerar a ciência como uma atitude, uma postura em relação aos problemas do mundo, a concepção científica do mundo. Este texto apresenta tal abordagem em conexão com o aspecto de transformação social que encontramos no pensamento de Neurath. Isso é feito

a partir de uma compreensão das ideias do Círculo de Viena e procurando entender uma continuidade entre as ideias dos membros de tal grupo, especialmente Neurath e Carnap. O presente texto procura, também, recuperar a ideia Neurathiana de que podemos utilizar uma abordagem filosófica à ciência para lutar contra os problemas do mundo.

**Palavras-chave:** Unidade da ciência; Neurath; Círculo de Viena; filosofia das ciências sociais; enciclopedismo.

## Notes

<sup>1</sup> For a broad presentation of the third approach, see Galison and Stump 1996. There is also the pragmatist approach, but we shall not discuss that in the present text.

<sup>2</sup> A study of the differences between Carnap and Neurath, stemming from a reading of Neurath as a critic of Carnap, can be found in Liston 2009.

<sup>3</sup> Hahn, Neurath and Carnap 1929; Henceforth, *Manifest*.

<sup>4</sup> See the *Aufbau* (Carnap 1928). Afterwards, Carnap left aside the requirement of reference to the a subject's elementary experience, taking physical objects as the basic ones in his system. Such shift, already considered in the *Aufbau* was stated in "The Unity of Science" (Carnap 1932a).

<sup>5</sup> This and the next sections will discuss Neurath's proposals. For more information, see Uebel 1991; Cartwright, Cat, Fleck and Uebel 1996; Nemeth, Schmitz and Uebel 2007; and Symons, Pombo and Torres 2011.

<sup>6</sup> This story is told from testimonies in M. Neurath and Cohen 1973, p.7–29. See also Cat, Cartwright and Chang 1996, for more historical, political, and sociological elements.

<sup>7</sup> See Nemeth 1982 for Neurath's view of Utopia and for his social engineering projects. See also the introduction (p.3–12) to Nemeth, Schmitz and Uebel 2007.

<sup>8</sup> Neurath 1921 provides a good example of the opposition to pseudorationalism. Nemeth 1982[1991] p.288–90 explains the origins of Neurath's stance and the continuity between such standpoint and the scientific world-conception.

<sup>9</sup> See Neurath 1973, chapter 7.

<sup>10</sup> See Carnap 1936-7, p.466.

<sup>11</sup> See discussions about that in Carnap 1934, and Carnap 1956.

<sup>12</sup> This aspect is emphasized by Cat, Cartwright and Chang 1996, p.362–9, in connection with other of Neurath's political projects.

<sup>13</sup> The ship illustration appears in many texts; the one quoted is probably the best known.

<sup>14</sup> Neurath, Carnap and Morris (org.) 1955 and 1970. Henceforth *Encyclopedia*.

<sup>15</sup> Neurath presented these ideas in his chapter to the opening number of the *Encyclopedia*, Neurath 1938. For more information on the *Encyclopedia*, see Cunha 201+, Reisch 2005, Nemeth and Roudet 2005.

<sup>16</sup> See Biagioli 1999.

<sup>17</sup> See, for example, Galison 1996, and Hacking 1996, for elaborations on that.

<sup>18</sup> In the German original, *Leben der Gegenwart* (Hahn, Neurath and Carnap 1929[1973], p.317).

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