

The Pyramid and the Mosaic: Otto Neurath's Encyclopedism as a Critical Model

Andrea Alberto Dutto

From analysis to praxis. Neurath's *Encyclopedia of Unified Sciences*

Otto Neurath (1882–1945) was one of the leading figures of the Vienna Circle, an association of neopositivist philosophers and scientists with common interests in modern logic. The circle's main focus was the role of language as a key point not only in philosophy but also in science. Particularly, language was assumed to be the most effective tool to ascertain the reliability of a philosophical statement, therefore to engage with metaphysical and nonverifiable dogmas. However, instead of unanimous agreement, the members of the circle were divided in different theoretical factions. Among these, Neurath stood among the more 'operative' faction, for whom the debate on language could not avoid a practical concern with social and political issues. This position countered the more 'neutral' side of the circle, among whom stood Rudolf Carnap, who was interested in the creation of an 'ideal language'. Neurath was critical towards this search for an 'ideal' and firmly argued that the degree of knowledge about formal language, discussed at the circle, was still detached from the way science was practiced. For this reason, throughout his life Neurath worked on a series of practical tools and experimental techniques aimed at developing science in relation to the social and political domains. For instance, Neurath is still mainly known today as the author of *Isotype* (International System of Typographic Picture Education), a method of 'visual education' used to popularise scientific knowledge, conceived in

collaboration with the graphic designer Gerd Arntz between 1926 and 1936.¹ In parallel with *Isotype*, during the thirties, Neurath invested a substantial effort in the development of an *Encyclopedia of Unified Sciences*, which represented the main cultural palimpsest of his philosophical thinking. This work showed an innovative direction, which Neurath believed promising for Logical Empiricism. Indeed, the encyclopedia not only established a continuity with the scientific project of the Enlightenment, but claimed an innovative position for the philosopher as orchestrator of scientific discourses.

Neurath argued that philosophical problems and 'problems of life' are mutually related because the scientific community operates within a social and political apparatus from which it is inevitably conditioned.² Therefore, for Neurath, the scientist should acknowledge his political status and commit himself to the domain of *Praxis des Lebens* (praxis of life). Neurath's demand for commitment was influenced by his political militancy in the Viennese social democracy. Indeed, in his early career, between 1921 and 1925, he was appointed Secretary of the Austrian Association for Settlements and the Allotment Gardens (*Verband für Siedlungs-und Kleingartenwesen*).³ This institutional role required a rigorous organisation applied to real productive conditions. As Nader Vossoughian describes:

Neurath wanted to develop approaches to city planning and housing reform that were interactive in nature. [...] In 1920 he established the Research

Institute for Gemeinwirtschaft, which hosted lectures, published policy papers and organized meetings with workers' groups and cooperatives. Its mission was to develop an economic plan for Austria in order to see what could be achieved for domestic production and foreign trade through the cooperation of all forces.⁴

Neurath's operative use of analysis as a political tool can be related to his adherence to Marxism.⁵ Particularly, Carnap noticed that 'in a series of private discussions with [some younger members of the circle, Neurath] explained the basic ideas of Marxism and showed their relevance to a better understanding of the sociological function of philosophy'.⁶ For Neurath, Marx's theory of value represented an example of 'empirical sociology' aimed at predicting future social developments through a precise account of the relations of production among social actors. However, Neurath undertook a slight change from the orthodoxy of Marxist doctrine. Indeed, while for Marx the analysis of social classes was based on economic laws, for Neurath the analysis was supposed to comprehend the broad domain of empirical facts, among which linguistic facts appeared particularly eloquent. This difference concerned two key concepts in particular.⁷ The first is that of 'mode of production', about which Marx had observed that no economical relationship is permanent but rather relative to historical conditions. Similarly, Neurath thought that language is supposed to change over time in relation to unpredictable events.⁸ The second concept implies the pair 'structure and superstructure', through which Marx distinguished the economic base (forces and relations of production) from the cultural domain (institutional and political apparatuses), where the 'structure' always determines the 'superstructure'. This relationship inspired Neurath to connect the empirical use of language with the material foundation of society. From this perspective, the search for an ideal language (such as Carnap's) appears related purely to the superstructure rather than the structure, and thus constitutes a pathetic

expression of false consciousness. No ideal language is possible for Neurath; only a language applied to the problem of life, namely to the relations of production, could express an operative effect in empirical reality.

However, it should be remarked that Neurath understood language in the logical empiricist sense. Indeed, in his view, language has the same hierarchical value as any empirical fact. This point is crucial to understand the difference between his approach and that of linguistic structuralism, which appears similar at first glance. Particularly, the difference becomes evident in Roman Jakobson's (1896–1982) wide spectrum of writings on language. Starting with his initial studies on phonology, Jakobson approached the discipline of linguistics with a certain determinism, which inevitably ended up feeding the emergent theory of structuralism. Although a description of this process might exceed the scientific aim of this essay, it is important to note that Jakobson's intention was to confer on language a certain primacy, as the prominent factor from which a social structure can be deduced.⁹ By contrast, Neurath avoided the structuralist approach, and instead opts for an empiricist approach. Indeed, rather than developing a theory of language itself, he attempted to restrict the use of language to the domain of empirical reality. For Neurath, language was a fact like any other fact, without any primacy among them, without a hierarchy. In his view, all facts were related on the same empirical plane and the logical empiricist's aim was to highlight this equality.

Neurath considered language an empirical fact, therefore as something subject to the laws of physics. In his view, physical science was not really dominant over other disciplinary fields, but rather *per via negativa*, that is, useful in order to avoid metaphysics and to strictly adhere to empiricism. For this reason, he defined his theory as physicalism, although he avoided the jargon of physicists

in favour of an 'improved everyday language'.¹⁰ Ostensibly, such a theory was not really new, but rather an improvement of both Marx's dialectical materialism and the Vienna Circle's neopositivism. Indeed, as Carnap notes: '[Neurath] believed that [...] physicalism was an improved non-metaphysical and logically unobjectionable version [of Marxism] which superseded both the mechanistic and dialectical forms of nineteenth-century materialism'.¹¹ Therefore, physicalism was a way to reduce ideas to phenomena, and linguistic facts to empirical facts.

In order to ascertain the empirical consistency of facts, Neurath adopted a rigorous linguistic device, which he defined as 'protocol statement'.¹² As described by Nikola Nottelmann: 'Neurath's protocol sentence structure [was] meant as an analysis of claims of experience or observation, in institutionalized science as well as everyday life'.¹³ Through the protocol statement the feelings of the observer were reproduced as a sequence of simple and reliable events as could be exemplified in this sequence: protocol [at a specific time]: [at a specific time] X perceived a spatio-temporal fact, X being a human individual. If any one step of the protocol statement was contradictory then the entire statement was discarded. Indeed, Neurath argued that:

when a new statement is presented to us we compare it with the system at our disposal and check whether the new statement is in contradiction with the system or not. If the new statement is in contradiction with the system, we can discard this statement as unusable ('false').¹⁴

Then, in relation to the committed errors, it is also possible to clarify the specific category of the erroneous statement at stake, whether it was: a 'lie', a 'hallucination', or a 'dream'.¹⁵

The protocol statement was not something imposed by the philosopher, but rather something

negotiated among the members of the scientific community, with the aim to work on a common basis.¹⁶ Therefore, if the protocol statement appeared as a possible common ground of sciences, this ground was inevitably political, because its rules were negotiated over time, and no 'definitive' rules could have been established *a priori*. Indeed, since judgment criteria were related to historical and ideological implications, they were supposed to change over time, their logical structure was thus intimately political.

Instead of a language, Neurath conceived a 'slang', specifically: a 'universal empiricist slang'.¹⁷ With this definition he underlined his detachment from any search for an 'ideal', or rather 'original' language of science. Indeed, as Neurath says,

we cannot find an absolute immutable basis for science; and our various discussions can only determine whether scientific statements are accepted by a more or less determinate number of scientists and other men. New ideas may be compared with those historically accepted by the sciences, but not with an unalterable standard of truth.¹⁸

Such 'slang' is an informal jargon, an impure language including both everyday and scientific terms as well as negotiations and social conflicts occurring simultaneously in reality. Moreover, it embodies the multiplicity of scientific modes of representation, either written or drawn. In this sense, the empirical slang seemingly synthesises Neurath's eclectic research interests and relentless curiosity to investigate a comprehensive spectrum of disciplines, from formal logic to infographics. Indeed, he argues that '[the] Encyclopedia will tend towards the unification of not only the scientific language, but also graphic representation. Curves and other figures are also instruments of scientific expression'.¹⁹ Similarly to Wittgenstein's 'language games', Neurath refuses to make a distinction between pictures and statements. The

problem at stake is not related to the nature of representation but rather to the verification of its empirical consistency.²⁰

Neurath addresses the concept of 'encyclopedism' as an innovative scientific concept for which 'the march of science progresses from encyclopedias to encyclopedias'.²¹ Particularly, in the essay entitled 'Encyclopedia as a model' (1936), he identifies a series of concepts that are strictly related to 'encyclopedism', namely: 'certainty', 'stability', 'protocol statements', 'systematisation'. Several of these concepts are drawn directly from physicalism, of which encyclopedism represents the continuation and the physical materialisation. However, what really differentiates the proposal of encyclopedism from Neurath's previous theories is the emphasis on contradictions and the science's inevitable shortcomings. In this sense, no 'systematisation', no 'certainty', and no 'stability' can be established in science. No original truth and no *tabula rasa* can be established as a point of departure, because 'truth' can only be negotiated among scientists and will inevitably change over time. For Neurath, the main task of science is to organise the totality of knowledge, therefore to integrate the contradictions as constitutive parts of the scientific discourse as well as of the social apparatus to which scientists belong. Indeed, Neurath argues that '[the] "Encyclopedia" is nothing but a preliminary assemblage of knowledge, not something still incomplete, but the totality of scientific knowledge'.²²

Furthermore, in order to clarify the concept of encyclopedism, Neurath adopts the metaphor of the mosaic against the pyramid.²³ In his view, the pyramid symbolises Auguste Comte's positivist approach, in which the philosopher stands at the top of the scientific edifice. By contrast, the mosaic represents the encyclopedia itself, namely the mosaic of empirical science.²⁴ Neurath avoids describing a hierarchical organisation among

the scientific disciplines and instead focuses on the possibility of establishing 'cross connections' among them.²⁵ However, the basic condition of the unified science is a shared agreement among the scientists about the degree of scientific development in relation to which a specific guiding principle can be established from time to time. For Neurath, advances in a specific field of science also determines advances in other fields. In this sense, the domain of unified science allows for the short-term prediction of trends of development. Thus, the weaving of the 'cross-connections' is supposed to be the main task of a scientific community, and a field characterised by particular affinities can temporarily establish systematised clusters of knowledge.²⁶

From a wider perspective, encyclopedism is subjected to the same principles of contrasts and sympathies as a social apparatus. In this sense, it is not a parallel universe or an alternative scenario to reality since it does not need to be planned from scratch like a *tabula rasa*, since no certainties can be assumed as foundational elements. Encyclopedism is an attitude, or rather, as Neurath would say, a behavioural tendency of science, therefore its evolution is as 'unpredictable' as reality. Indeed, due to historical contingencies the direction of its development could not be predicted at the beginning: the steps and direction of development were left open.²⁷ Therefore, the notion of 'chance' had a fundamental role in Neurath's thinking, which did not allow a deterministic approach to be implemented in science. In his view, the edifice of science was a mutant organism characterised by rules of development that reacted in the same way to the unpredictable events of life.

As is widely known, encyclopaedic attempts have been undertaken by representatives of different disciplines and at various times in history. In particular, Neurath claimed Diderot and d'Alembert's *Encyclopédie* (1751–65) as the forerunner of his

project, although it appeared not collective enough to fulfil his own expectation of scientific fraternity in the domain of unified science. He argued that:

the representatives of logical empiricism in some way continue the work that d'Alembert, with his aversion to systems, originated. But they are 'encyclopedists' much more consciously, and in a sense much more rigorous than their great forerunners. The encyclopedia can thus become the symbol of a developed scientific cooperation, of the unity of the sciences, and of the fraternity between the new encyclopedists.²⁸

Neurath saw the *Encyclopédie* as an initial attempt at a collaborative platform between scientific and technical domains.²⁹ More specifically, it established the possibility for a common 'grammar' shared by different contributors belonging to the industrious community of technicians, specialists, craftsmen, and scientists. In order to represent what could not be communicated through texts, the *Encyclopédie* made innovative use of graphic language, a hybrid of images and texts. Thanks to this innovative language, suddenly technical knowledge achieved a representation that we still recognise as the expression of a great collective effort, rather than the exclusive aristocratic privilege that science had been before. This collective outcome corresponded with Neurath's ambition, and with his '*neue Enzyklopädie*' he attempted to continue the comprehensive efforts of the *Encyclopédie*.

Moreover, Jean-Baptiste D'Alembert's introductory essay (*Discourse préliminaire*) identified three fundamental rules of orchestration, namely: cooperation between 'men of talent', the exclusion of abstract and very general ideas, and the unification of languages as a necessary precondition to the unification of science.³⁰ Such rules were prophetic in relation to Neurath's project and somehow established the fundamental principles of encyclopedism. Particularly, since there was no

master of the encyclopedia, Neurath proposed the ambiguous figure of the 'orchestrator'. Rather than a specific subject, the orchestrator represents the attitude of the scientist, therefore a way of practising science with the aim to coordinate and connect different scientific discourses and to situate his own analytical work within a collective target, namely unified science.

Starting in 1936 until his death in 1945, Neurath dedicated most of his writings to the subject of encyclopedism in science, and to the *International Encyclopedia of Unified Sciences* published as a collection of three 'foundational' volumes. In fact, Neurath wrote three essays that postulated the fundamental features of the encyclopedia. The first, entitled 'An International Encyclopedia of Unified Science' (1936), was both a summary of Neurath's encyclopedism and an overview on the main features of physicalism. The other essays, entitled 'Unified Science and its Encyclopedia' (1937) and 'The new Encyclopedia of scientific empiricism' (1937), described the main managerial features of this endeavour, material and economic issues, as well as a schedule of international meetings and conferences related to its development. During these meetings individual contributors were asked to present their outcomes to the overall scientific community in order to achieve a shared consciousness in scientific development and to implement the universal empiricist slang. From this point of view, Neurath's encyclopedia was more like a cultural project than a conventional publication.

The project of a unified science (*Einheitswissenschaft*) was accomplished in 1937, when Neurath established the International Institute for the Unity of Science in the Hague. Neurath provides a summary of the four main methodological issues of unified science in the essay entitled 'The departmentalization of unified science' (1937). The first point concerns 'the principle only to select scientific

units of a relatively well-circumscribed character [although] an overlapping of certain disciplines is at first not avoided'.³¹ In this way, the unified science avoids the 'main divisions of traditional systems [which] anticipated the acceptance of and the objections to a great many scientific decisions, for instance to the application of particular scientific procedures to certain disciplines'.³² The second point of concern is the logical order of development, from simple to complex. Indeed, Neurath argues that 'the analysing scientist might progress from smaller fields to wider fields and find out manifold intercorrelations and combinations forming a very rich logical pattern'.³³ Therefore, the initial objects of analysis are 'neutral' and avoid hierarchical organisation of facts and disciplines. For this reason, Neurath argues that 'the smaller those initial scientific units, the less changes [are] necessary in the scientific descriptions'.³⁴ The third topic recalls the primacy of everyday language, namely that the scientific statements of all disciplines should be formulated 'by means of the terms of a universal slang composed of ordinary terms of everyday language'.³⁵ A fourth point remarks on the 'flat' ground of encyclopedism, namely a plane that avoids any hierarchy among disciplines. For Neurath, encyclopedism concerns 'the fact that the vast mass of the group of statements [...] are in one plane [because] there is no symmetrically pyramidal edifice'.³⁶ No arrogant statement can provide a solid ground for the unified science because no statement out of a discussion among scientists can be verified.

This list provides all the general principles necessary for the project. All questions about the legitimacy of these rules supposedly already form part of the scientific endeavor. However, in the concluding paragraph of this fundamental essay, Neurath makes the most categorical statement of his philosophical papers, namely: 'what can be achieved by means of this unpretentious integrating programme which avoids all bumptiousness in scientism? One cannot anticipate this by means

of explanations, it can only be proved by the work itself'.³⁷

One among the possible encyclopedias. Mario Ridolfi and the *Manuale dell'architetto CNR* (1945)

Generally speaking, architecture never had a prominent position among the topics of encyclopedias. Ancient encyclopedias, such as Isidore of Seville's *Etymologiae* (600–25), concerned architecture as a metaphorical term, namely as an edifice of universal knowledge, or rather as an allegorical representation of metaphysical values. In Diderot and d'Alembert's *Encyclopédie* the item 'Architecture', edited by J.F. Blondel, related this discipline mostly to the domain of the arts with a specific focus on the fundamental institution of the classical orders. Two centuries later, Neurath's *Neue Enzyklopädie* did not even mention architecture among the topics of the unified science.

Likewise, it should be acknowledged that architects manifesting a particular involvement in encyclopedism are rare, and those who consider encyclopedism as a possible philosophical foundation of architectural design are even rarer. In this scenario, Mario Ridolfi (1904–1984) represents an exceptional case of an architect who intends design as the orchestration of technical knowledge, and therefore architecture as an encyclopedic practice. He is mainly known as the principal editor of the construction handbook *Manuale dell'architetto CNR* (1946), a great collective work aimed at gathering and organising construction practices in view of a vast reconstruction programme of the Italian settlements damaged during the Second World War.³⁸ After the handbook experience, Ridolfi continued his encyclopedic commitment through his professional activity mainly related to the design of small houses and facilities in the Italian countryside.

Therefore, in the second part of this article Ridolfi's work is held up as an example of encyclopedism

applied to architecture, more precisely as an attempt to describe the art of construction as a praxis of negotiation among technicians specialised in different fields of building science.

Ridolfi is improperly considered an exponent of 'regionalism'. Although his designs look vernacular, he in fact avoided an aesthetic ideology. From the point of view of architectural styles, Ridolfi was an atheist. Indeed, his aim was not the invention of a new architectural style, nor an ideal architecture, but rather an architecture that provided answers to real problems and reflected the culture in which it was located, namely the economic structure, either artisanal or industrial. The final shape of his design resulted from negotiations with builders and craftsmen, with whom he maintained close relationships.

Therefore, 'realism' is probably the best expression to understand Ridolfi's attempt to ground himself in the productive reality of the place where he worked. Ridolfi raised architectural design to the same level as technical manufacturing, which he indefatigably analysed by means of careful redrawing procedures and classifications. Paolo Portoghesi defines Ridolfi as a 'realist' who 'highlighted the relationship between architecture and collective life, that was generally lacking in modern developments, [with] special attention to daily reality, human relationships, and community spirit'.³⁹

His work rose to prominence in Italy after the Second World War, when an extensive campaign of urban re-development was undertaken.⁴⁰ The resources available for the reconstruction were discouraging, both in intellectual and material terms. Therefore, the reconstruction presented an occasion to undertake the mass education of unskilled workers, as well as a way to coordinate the alignment of productive forces and social apparatuses. An ethical value was conferred to the activities that led and supervised the construction process, as

well as to 'neo-realist' literary and cinematographic works that documented the 'problems of life' in which the same process of reconstruction took place.⁴¹ Ridolfi's expertise was unanimously recognised as an important contribution, thanks particularly to the research on building normalisation he undertook continuously between 1935 and 1953.⁴²⁻⁴³

In this context of reconstruction, Ridolfi is charged as editor-in-chief (and draftsman of 60 plates out of 264) of the *Manuale dell'architetto CNR*, conceived as a handbook for architects and engineers.⁴⁴ Its publication in 1946 was economically supported by an agreement between the National Research Council (CNR), which funded the editorial staff, and the USIS (United States Information Service) charged with the publishing cost. Started in June 1945, the editing phase required ten months of intense work, after which 25,000 copies were published and distributed free of charge to engineers and architects across the country. Its main target was to achieve an operative platform that could gather different sectors and levels of expertise, including spontaneous construction practices.⁴⁵ While experimental tendencies related to modernist settlement and architectural styles were kept out, the underdeveloped technology of available building practices became the starting point for the *Manuale CNR*, which tried to interconnect them as a unified building science.⁴⁶

In this sense, the most relevant predecessor of the *Manuale CNR* was Gustav Adolf Breyman's *Allgemeine Baukonstruktionslehre* (1884) that still at the time represented a reliable source of construction details as well as a comprehensive overview of the main construction techniques related to different building materials, such as wood, steel, bricks, and so on.⁴⁷ Actually, Ridolfi thought that an updated version of Breyman's handbook was needed, since most of his details were no longer suitable to modern building practices.⁴⁸ Moreover, unlike Ernst Neufert's *Bauentwurfslehre* (1936),

Ridolfi's *Manuale CNR* abstained from providing either a repertoire of floor plans ready to be reproduced or a classification of modern functional typologies.

Mainly, *Manuale CNR* focused on traditional building methods. This choice was undoubtedly influenced by Ridolfi, who saw in the Italian building tradition the presence of a dialogue between architects and builders that modern industrial manufacturers were not able to provide. In his view, work phases as well as the contributions of individual craftsmen were only supposed to be improved and definitely not overcome in favour of industrial methods. Unlike industrial prefabrication, traditional building methods allowed a broad set of customisation techniques that could respond to different environmental conditions as well as to individual dwelling requirements. Indeed, Ridolfi considered dwellers as fundamental interlocutors rather than the generic individuals hypothesised on statistical parameters by the manufacturing industry. For Ridolfi, in order to produce good architecture, the inhabitants were supposed to actively participate and assume a position with regard to construction choices and planning strategies. However, there was a practical reason behind this otherwise seemingly ethical choice. Indeed, in the eyes of institutions, such emphasis on traditional techniques appeared a smart way to implement national directives into local areas where the available resources were largely related to traditional building methods. Traditional architecture, albeit characterised by evident underdeveloped technological conditions, seemed to be the starting point for a comprehensive programme of innovation and modernisation as well as an alternative to industrial prefabrication. In this sense, Ridolfi underlined both the collective nature of the reconstruction work and the participative effort required in the overall technical practices operating in Italy, each within the limits of its own local requirements and specific skills.

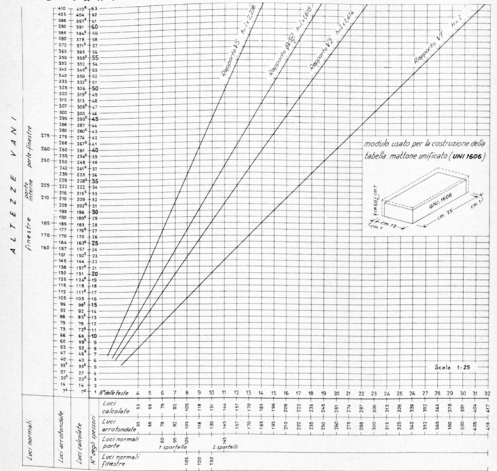
The handbook is conceived as a mosaic of scientific contributions. The table of contents is subdivided into eight thematic sections: 'Norms', 'Urban planning', 'Building materials', 'Statics', 'Structural elements', 'Finishings', 'Technological devices', 'Ergonomics and Typical dimensions'. However, the organisation of each thematic section is substantially different from the others. At a glance the different levels of evolution and upgrade speeds among the main sectors of building science is evident. For example, the 'Structural elements' section requires more plates than the 'Urban planning' section, mirroring the moment of uncertainty about urban policies, animated by contrasts between supporters of self-sufficient neighbourhoods and orthodox rationalist planners. Likewise, the 'Finishings' section, edited by Mario Ridolfi, is much more developed compared to the 'Technological devices' section which provides a very brief overview of the main heating and supply technologies available at the time. Therefore, the handbook presents a straightforward portrait of the Italian cultural and economical scene, which lacked an overall coordination among technical sectors.

The layout of the *Manuale CNR* was strictly influenced by the normalisation process started in 1928 by the UNI (Italian National Unification) association. The graphic layout of the plates is based on the UNI A4 (21 x 29.7cm). Three punched holes allow for the progressive gathering into binders, so that the handbook could be updated over time. The content is indicated through a code marked on the top corners of the plates. The first letter indicates the thematic section (eg. 'F' stood for 'Finishings') and is followed by a number related to a specific subject within that section (eg. 4 / Window fixtures) coupled with a letter, indicating its progression (eg. g / Roller shutter). Moreover, the building elements are also related to the UNI measurements. For instance, the normalised dimension of the brick (UNI Brick: 12 x 25 x 5.5cm) establishes a proportional relation between the single element and the size of the

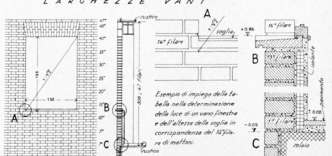
3. LUCE VANI AL RUSTICO CON MATTONI U.N.I.

MANUALE DELL'ARCHITETTO, A CURA DEL CONSIGLIO NAZIONALE DELLE RICERCHE - PUBLICATO DALL'UFFICIO INFORMAZIONI STATI UNITI

LUCE VANI AL RUSTICO CON MATTONI U.N.I.



La tabella delle luci e delle altezze si applica alle murature in mattoni U.N.I. con spessore di 24 cm. Il calcolo per murature di spessore diverso si fa applicando la formula: $L_v = \frac{L_v \cdot S}{S_v}$ dove L_v è la luce, S lo spessore della muratura, S_v lo spessore del mattone. Esempio: $L_v = 100 \cdot \frac{24}{110} = 21,8$ cm.



TIPI DI MURATURE IN MATTONI 3c

MANUALE DELL'ARCHITETTO, A CURA DEL CONSIGLIO NAZIONALE DELLE RICERCHE - PUBLICATO DALL'UFFICIO INFORMAZIONI STATI UNITI

SPESORE DEI MURI IN MATTONI PIENI E FORATI PER I TIPI PIÙ USATI IN ITALIA

TIPO DI MURATURA E DESIGNAZIONE COMERCE	SPESORE DEI MURI							
	con intonaco				senza intonaco			
	12	14	16	18	12	14	16	18
Mattoni pieni	20	22	24	26	18	20	22	24
Mattoni forati	18	20	22	24	16	18	20	22

TIPO DI MURATURA E DESIGNAZIONE COMERCE	L	S	E	m	L		L		L		L	
					24,5	26,5	28,5	30,5	32,5	34,5	36,5	
Mattoni pieni	20	22	24	26	28	30	32	34	36	38	40	42
Mattoni forati	18	20	22	24	26	28	30	32	34	36	38	40

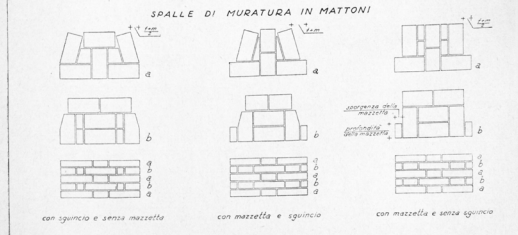


Fig. 1: Brick normalization. Source: Cino Calcaprina, Aldo Cardelli, Mario Fiorentino, and Mario Ridolfi, eds., *Manuale dell'architetto* (Rome: CNR-USIS, 1946).

openings which are then automatically subjected to the normalisation process. [Fig. 1] The normalisation of the brick became a way to address modern standardisation through a process of updating traditional building materials.

Rather than plans and sections, the content is represented by the means of diagrams, technical charts, charts and other techniques that until that moment were used mainly by scientists rather than architects. Unlike previous construction handbooks such as the aforementioned Breyman's *Allgemeine Baukonstruktionslehre*, where details are simply isolated and reproduced on a larger scale, the *Manuale CNR* displays an in-depth scientific analysis of the intrinsic features of building elements, such as their performance and combinatorial possibilities.

The 'performance' of building elements is represented by means of diagrams and charts, as is well exemplified in the sections related to 'Structural elements' and 'Technological devices'. These sections show the relationship between building elements and invisible factors that intervene in the definition of their form. Indeed, in order to be appropriately implemented, structural and technological elements require a rigorous procedure of calculation based on the results of empirical tests represented in diagrams and charts. In particular, this condition is evident in the plates dedicated to reinforced concrete structures. Here, the size of the beams, as well as the amount of concrete and steel, is strictly related to the structural diagram layout, which becomes an integral part of the overall definition of the beam itself. Therefore, diagrams represent the building elements in a way that reflects their empirical nature. In this sense, the diagram translates a constructive figure into an empirical fact, namely a fact explained through physical laws and completely purified of metaphysical or aesthetic speculation.

In addition to diagrams, the handbook implements the use of the technical chart in order to represent combinatorial elements (such as windows, fixtures, furnishings, and so on) and other kinds of assemblages. Particularly, the section dedicated to 'Finishings', edited by Ridolfi, shows an extensive use of the technical chart in which single elements can be combined. For instance, the technical chart of the window fixtures shows the various ways different components of a node can be coupled, joined, or hooked in relation to different layouts and window sizes. [Fig. 2] Moreover, the technical chart allows Ridolfi to address design issues of variable complexity and dimension. For instance, at the larger scale in the urban development plan for Terni, Ridolfi uses the technical chart in order to show various combinatorial possibilities of a single residential unit with the same combinatorial approach applied to the combinatorial plate of the window fixtures. [Fig. 3] In this way, the technical chart establishes a continuity between small construction details and large urban clusters.

Through these innovative representation techniques, the *Manuale CNR* attempted to represent architecture as a collective work where all fields of construction science converge. At the same time, it also established a precise orientation for architectural design, which instead of aiming at formal expression, has to support a continuous dialogue as well as a negotiation between the forces of production. Design was intended as a way to stage a social reality, to represent Italian culture by the means of its productive skills embodied in traditional building techniques. Nevertheless, the *Manuale CNR* did not achieve the expected success and in 1962, after its third edition, it was no longer updated.

After the experience with *Manuale CNR*, Mario Ridolfi undertook further research on building normalisation in 1949. Later, his encyclopaedic activity continued in the field of traditional

FINESTRA IN LEGNO - ABACO DEI NODI ORIZZONT. 4c F

MANUALE DELL'ARCHITETTO, A CURA DEL CONSIGLIO NAZIONALE DELLE RICERCHE - PUBBLICATO DALL'UFFICIO INFORMAZIONI STATI UNITI

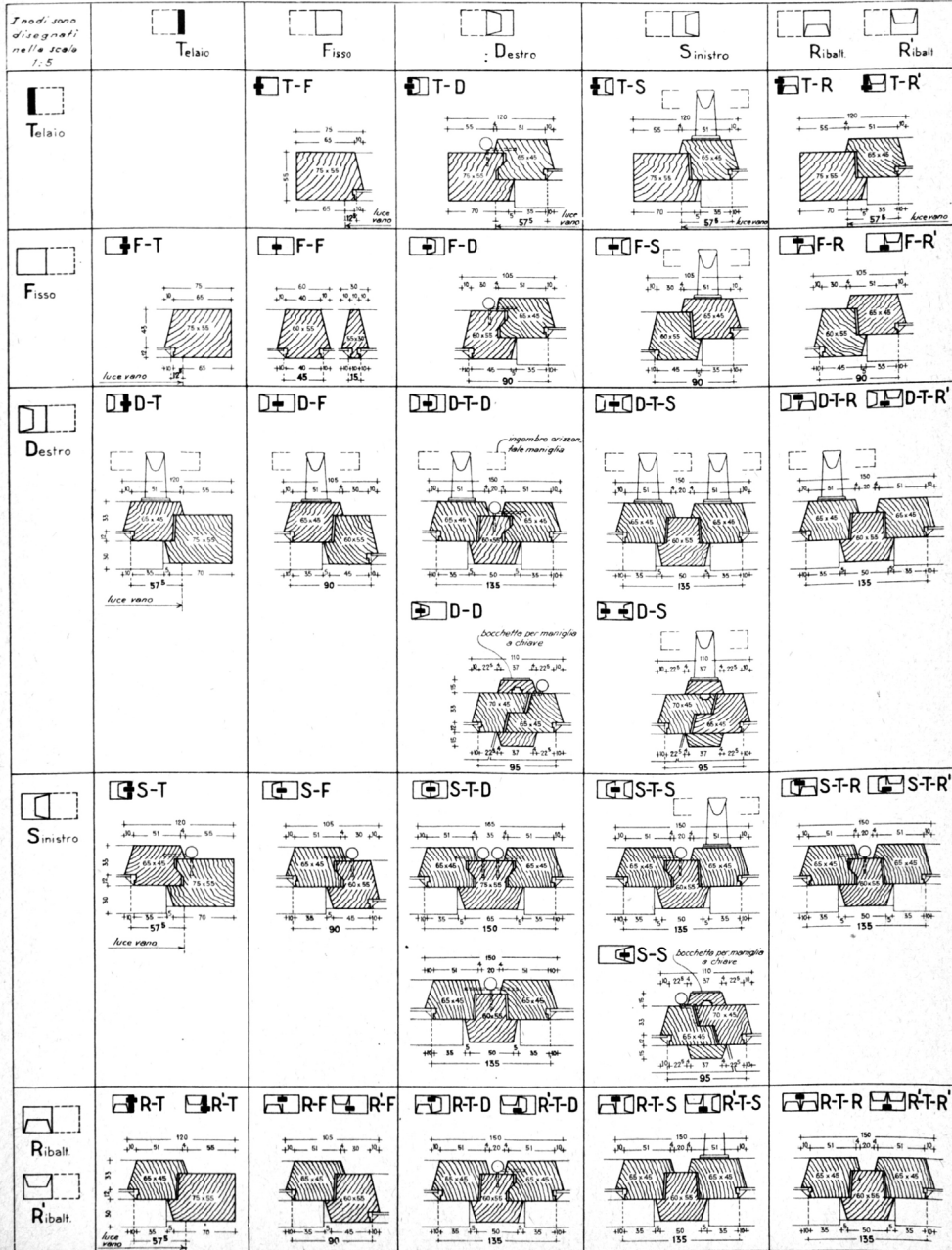


Fig. 2: Technical chart of window fixtures. Source: Cino Calcaprina, Aldo Cardelli, Mario Fiorentino, and Mario Ridolfi, eds., *Manuale dell'architetto* (Rome: CNR-USIS, 1946).

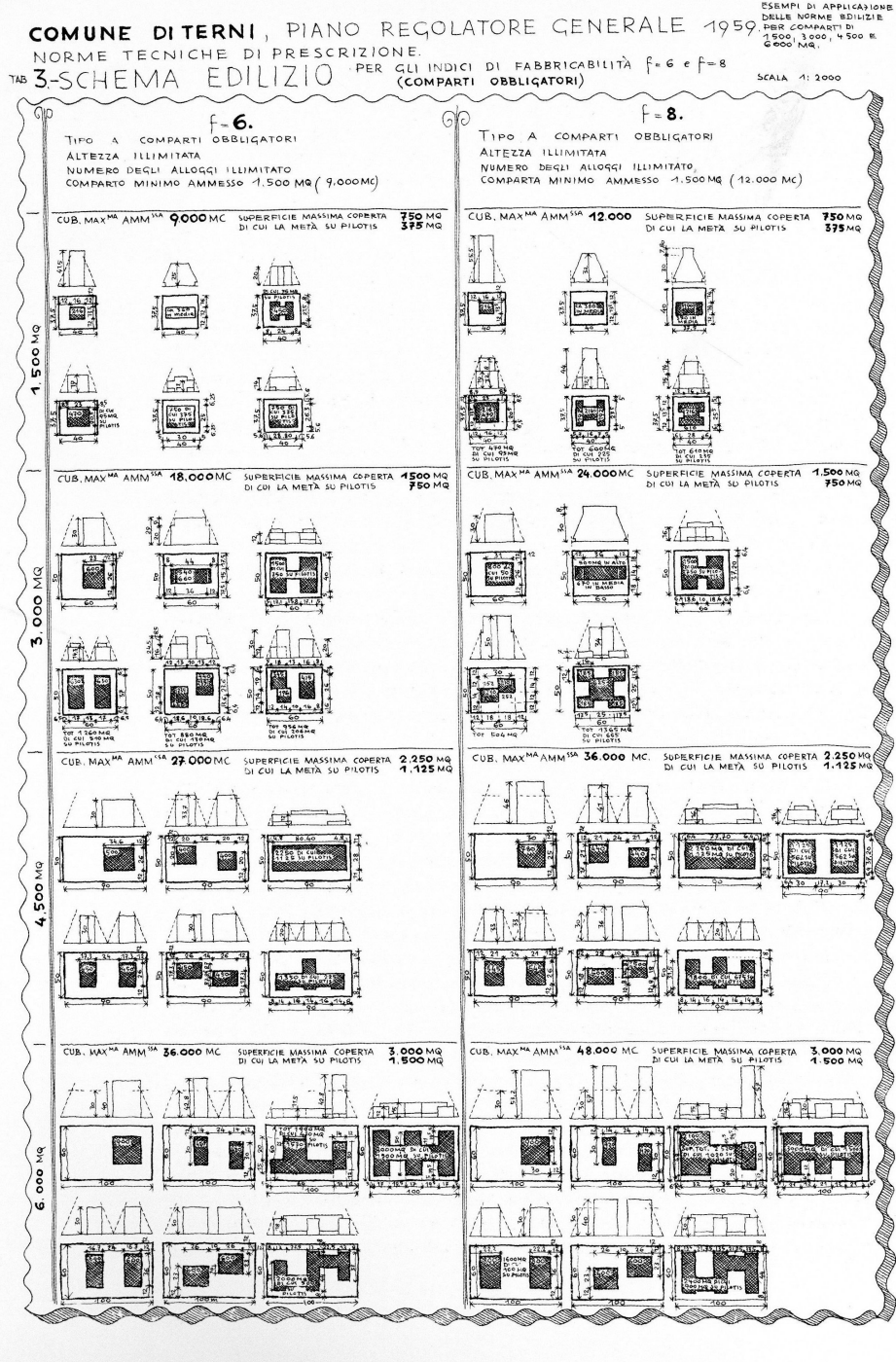


Fig. 3: Technical chart of the residential units conceived by Mario Ridolfi for the Urban Development Plan of Terni (1959). Source: Cellini, Francesco, and Claudio D'Amato. *Le architetture di Ridolfi e Frankl*. Milan: Electa, 2005.

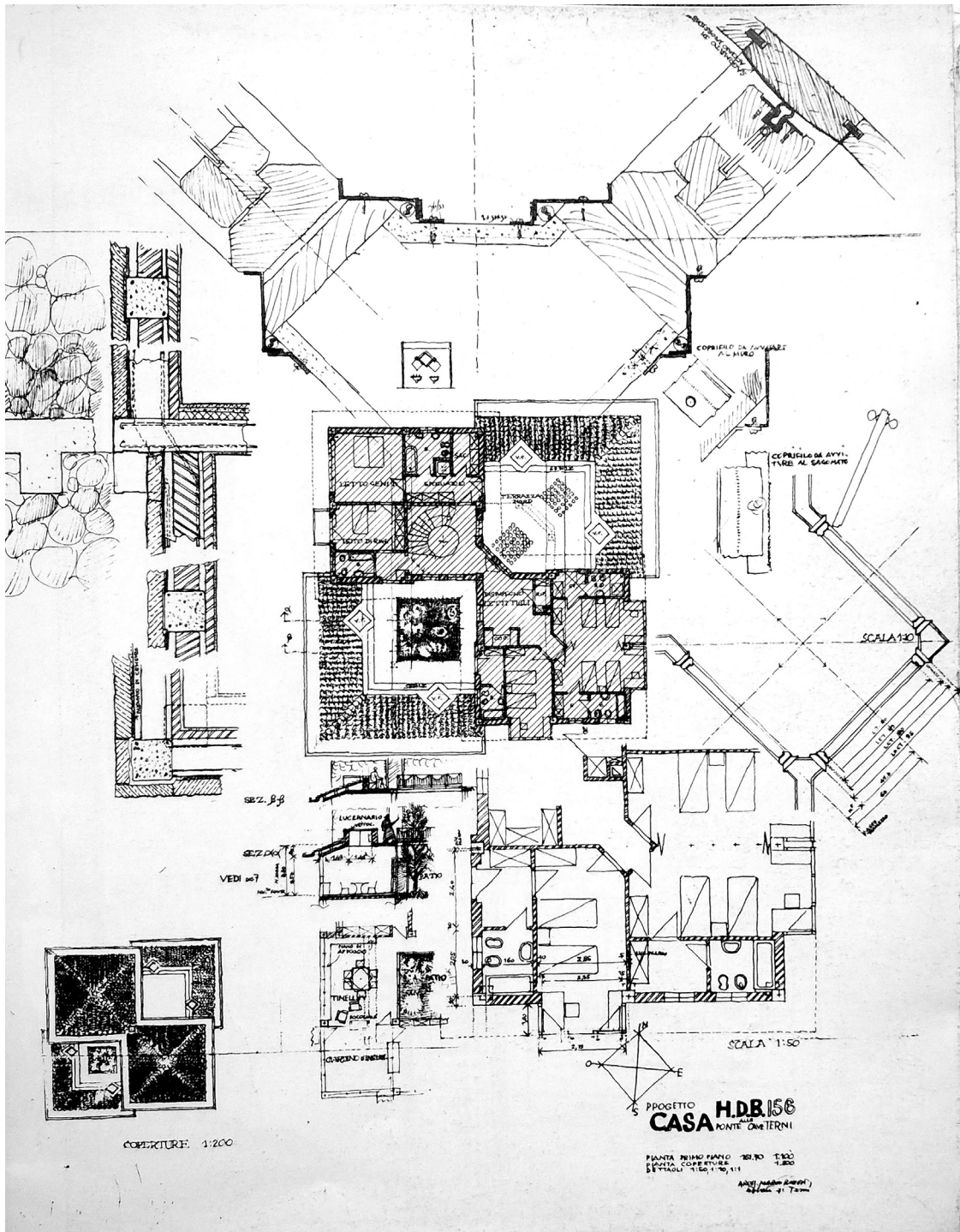


Fig. 4: Morphological affinities between architectural plan and technological details in Mario Ridolfi's drawings for Casa De Bonis I (1971). Source: Cellini, Francesco, and Claudio D'Amato. *Mario Ridolfi: manuale delle tecniche tradizionali del costruire: il ciclo delle Marmore*. Milan: Electa, 1997.

construction techniques when, in the last stage of his career, he moved to the *Marmore*, a place in the Umbrian countryside. Here, Ridolfi spent the last years of his life and after various family misfortunes he committed suicide. The *Ciclo delle Marmore* is a 'handbook of traditional building techniques' compiled between 1966 and 1984, during which he designed a dozen single-family houses.⁴⁹ In this work there is no distinction between the roles of architect and builder. Both of them are integrated within the same 'unified science' of building.

At the *Marmore* the building site assumed an existential meaning for Ridolfi. He worked closely with craftsmen and builders. Moreover, it represented a place that had not yet metabolised the pressure of industrial development. The relationship between production and the social structure was reconciled. This condition is particularly evident in Ridolfi's drawings where a strong relationship among masons, carpenters, and craftsmanship is apparent.⁵⁰ Every new project was not really intended as an experimental formal attempt, but rather as an occasion to establish temporary patterns of temporary artisans' communities working for a shared ambition.

Although Ridolfi may look like a drawing virtuoso, he actually used drawing as a logical tool. Drawing was not conceived as an autonomous gesture, but rather as a way to state a problem and to connect all the necessary references to solve it. For Ridolfi, drawing facts and construction facts could not be separated. For this reason, the houses Ridolfi designed at *Marmore* were not standard buildings but rather 'nodes'.⁵¹ The term 'node' meant a way to compress the sum of all technical contributions into a single design idea. In this sense, the 'node' is an encyclopedic building. The logical combination Ridolfi developed at *Marmore* is sometimes so complex and articulated as to almost hide the plan itself. For example, in the plate for *Casa De Bonis I* the node is represented through the comparison of

an enlarged window detail and the ground floor plan of the house: the two figures appear to be not only formally but also logically related. [Fig. 4]

The methodological approach implemented by Ridolfi at the *Marmore* was in direct continuity with the *Manuale CNR*. Although the ambitions and scale of research were widely reduced, the analytical approach remained the same. For Ridolfi, only an in-depth investigation of the technical resources of a national or local reality allowed the identification of specific design issues, and consequently the choice of appropriate analytical tools. In this sense, architectural design was not only a way to negotiate construction issues with a productive apparatus, but also, in a wider perspective, a 'lens' through which the conditions of an overall social apparatus could be read and represented.

Concluding note

The year the *Manuale CNR* was published falls within the decade when Otto Neurath's *Encyclopedia of Unified Science* was elaborated and published. Nevertheless, although no effective contact between the two works is historically documented, they do show methodological affinities. Both claim that disciplinary development cannot be conducted in isolation, nor detached from reality. Therefore, the choice of encyclopedia is a way to assert knowledge as a collective project. Moreover, moving research outside of the single disciplines implies a relation with the social and political problems of the time. Scientific knowledge thus becomes an object of negotiation and at the same time a way to establish a mirror between science and society, between scientific research and political commitment.

Both of these works remained dramatically unfinished. Every attempt to continue these projects was ineffective. Nevertheless, the methodological approach of encyclopedism still remains a model for knowledge development, more precisely a critical model. Faced with encyclopedism we inevitably

ask ourselves: How critical are we in our analytical approach? How self-referential is our analytical approach towards our discipline?

Notes

1. Otto Neurath, Marie Neurath, and Robert S. Cohen, 'From Vienna Method to Isotype,' in *Empiricism and Sociology* (Dordrecht: Springer Netherlands, 1973), 214–23. See also Otto Neurath, 'Isotype', in *Empiricism and Sociology*, ed. Marie Neurath and Robert S Cohen (Dordrecht: Springer Netherlands, 1973), 224–48.
2. 'The practice of living reduces the multiplicity quickly. The unambiguity of the plans to be put into operation enforce the unambiguity of predictions'. Otto Neurath, 'Radical Physicalism and the "Real World"', in *Philosophical Papers, 1913–1946* (Dordrecht: Reidel, 1983), 105.
3. See Nader Vossoughian, *Otto Neurath : The Language of the Global Polis* (Rotterdam: NAI Publisher, 2008), 27–44.
4. *Ibid.*, 29.
5. 'Marxism is engaged in tracing correlations between the social condition and the behavior of whole classes, and then deducing the frequently changing word sequences that are used to 'motivate' behavior which is thereby conditioned and deducible with the help of laws'. Otto Neurath, 'Sociology in the Framework of Physicalism', in *Philosophical Papers*, 80.
6. Paul Arthur Schilpp, ed., *The Philosophy of Rudolf Carnap* (La Salle/III: Open Court, 1997), 24. See also Neurath, Neurath, and Cohen, *Empiricism and Sociology*, 45.
7. See Danilo Zolo, *Scienza e politica in Otto Neurath: una prospettiva post-empiristica* (Milan: Feltrinelli, 1986), 119–23.
8. In this sense, Neurath affirmed that 'Marxism [was] engaged in tracing correlations between the social condition and the behaviour of whole classes, and then deducing the frequently changing word sequences that are used to 'motivate' behaviour which is thereby conditioned and deducible with the help of laws'. Neurath, 'Sociology in the Framework of Physicalism,' 79–80.
9. See Roman Jakobson, *The Framework of Language* (Ann Arbor: University of Michigan, 1980).
10. 'It would be a mistake to believe that the physicalist rendering of everyday affairs must be complicated because very complicated physical formulas are needed – some of which are not yet at hand – for the calculation of certain correlations. The physicalist everyday language comes from prevailing everyday language'. Neurath, 'Sociology in the Framework of Physicalism,' 65.
11. Neurath, Neurath, and Cohen, *Empiricism and Sociology*, 45.
12. 'Strings of "ink blobs on paper" and strings of "air perturbations", which can be considered equal under certain circumstances, are called statements'. See Otto Neurath, 'Protocol Statements', in *Philosophical Papers, 1913–1946* (Dordrecht: Reidel, 1983), 91–99.
13. Nikola Nottelmann, 'Otto Neurath on the Structure of Protocol Sentences; A New Approach to an Interpretative Puzzle', *Journal for General Philosophy of Science* 37, no. 1 (2006): 173.
14. Neurath, 'Protocol Statements', 94.
15. Thomas E. Uebel, 'Neurath's Protocol Statements: A Naturalistic Theory of Data and Pragmatic Theory of Theory Acceptance', *Philosophy of Science* 60, no. 4 (1993): 590.
16. 'The scientific realm – as argued by Neurath – forces us to cooperate and to begin again and again from the protocol statements which we have in common'. Otto Neurath, 'The Orchestration of the Sciences by the Encyclopedism of Logical Empiricism', *Philosophy and Phenomenological Research* 6, no. 4 (1946): 507.
17. Neurath, 'Universal Jargon and Terminology', in *Philosophical Papers*, 213–29.
18. Neurath, *Philosophical Papers*, 181.
19. Neurath, 'An International Encyclopedia of Unified Science', in *Philosophical Papers*, 142.
20. David Keyt, 'Wittgenstein's Picture Theory of Language', *The Philosophical Review* 73, no. 4 (1964): 493–511.
21. Neurath, 'Encyclopedias as 'Model,'" in *Philosophical*

- Papers*, 145.
22. *Ibid.*, 146.
 23. 'Encyclopedism shows at a glance less harmony than its predecessors, based on "Pyramidism". It accepts the fact that the vast mass of the groups of statements are, as it were, in one plane'. Neurath, 'The Departmentalization of Unified Science', in *Philosophical Papers*, 204.
 24. Otto Neurath, 'Unified Science as Encyclopedic Integration,' in *International Encyclopedia of Unified Science*, vol. 1 (Chicago: University of Chicago Press, 1946), 3.
 25. 'The establishment of cross-connections is in close relationship with the question of unity of terminology, with the creation of a "universal jargon" containing at the same time everyday terms and scientific formulas, the different languages that one can either join together or reduce one from the other'. Neurath, 'Encyclopedias as "Model"', 155.
 26. 'The mosaic pattern of the sciences might in the course of the ages show features more and more connected but always changing, if the scientific attitude will remain at all valid'. Neurath, 'The Departmentalization of Unified Science,' 204.
 27. 'It seems to me important that "unpredictability" plays its part within Empiricism.[...] Sometimes the behaviour of human groups may be connected with some changes which appear "by chance". Neurath, 'The Orchestration of the Sciences by the Encyclopedism of Logical Empiricism', 245.
 28. Neurath, 'Encyclopedias as "Model"', 158.
 29. The necessity of a similar collaborative platform between science and technology is highlighted in Gilbert Simondon's philosophical research on the 'technical object'. Gilbert Simondon, *Du mode d'existence des objets techniques* (Paris: Aubier-Montaigne, 1969).
 30. For an accurate analysis of the relationship between d'Alembert and the Encyclopédie see Franco Venturi, *Le origini dell'Enciclopedia* (Turin: Einaudi, 1963), 70–108.
 31. Neurath, 'The Departmentalization of Unified Science', in *Philosophical Papers*, 201. Here Neurath provides a list of well-circumscribed sciences, namely: Heraldry, Criminology, Theory of Business Cycles, Engineering, History of Fine Arts, Phonetics, Comparative Grammar, Procedures of Historical Study, Anthropogeography, Psychiatry, Theory of Achievement and Behaviour, Anthropometry, Historiometry, Mendelism, Procedures of Botanical Study, Ecology, Geology, Astronomy, Cosmology, Physics, Theory of Probability, Vector Analysis.
 32. *Ibid.*, 200.
 33. *Ibid.*, 203.
 34. *Ibid.*, 202.
 35. *Ibid.*, 203.
 36. *Ibid.*, 204.
 37. *Ibid.*
 38. 'The march of science progresses from encyclopedias to encyclopedias. It is this conception that we call encyclopedism'. Neurath, 'Encyclopedias as "Model"', 146.
 39. Paolo Portoghesi, 'Il realismo di Ridolfi,' in *Mario Ridolfi Architetto 1904–2004*, ed. Renato Nicolini (Milan: Electa, 2005). Similarly, Giovanni Durbiano states that Ridolfi's architectural work represents the 'first possible exponent of a "realist architecture"' in the post-war period after the Second World War'. Giovanni Durbiano, *I nuovi maestri: architetti tra politica e cultura nel dopoguerra* (Venice: Marsilio, 2000), 71.
 40. Manfredo Tafuri, *Storia Dell' architettura italiana : 1944–1985* (Turin: Einaudi, 1986), 4–39.
 41. Manfredo Tafuri, 'Architettura e Realismo,' in *Architettura moderna : l'avventura delle idee, 1750–1980* (Milan: Electa, 1985), 123.
 42. Mario Ridolfi, 'Contributo allo studio sulla normalizzazione degli elementi di fabbrica. Proposta di un sistema per la normalizzazione degli infissi in legno,' *Architettura V* (1940): 241–48.
 43. Francesco Cellini et al., *Le architetture di Ridolfi e Frankl* (Milan: Electa, 2005), 32–37.
 44. Cino Calcaprina, Aldo Cardelli, Mario Fiorentino, and Mario Ridolfi, eds., *Manuale dell'architetto* (Rome: CNR–USIS, 1946).
 45. Carlo Guenzi, Emilio Pizzi, and Alessandro Ubertazzi,

- 'Manualistica e cultura tecnica,' *Casabella*, no. 439 (1978): 10–17.
46. Francesco Barrera et al., *L'arte di edificare. Manuali in Italia 1750–1950*, ed. Carlo Guenzi (Milan: BE-MA Editrice, 1981).
47. Barrera et al., *L'arte di edificare*, 216.
48. Mario Ridolfi, 'Il Manuale dell'architetto', *Metron* 8 (1946): 35–42.
49. Francesco Cellini and Claudio D'Amato, *Mario Ridolfi : manuale delle tecniche tradizionali del costruire : il ciclo delle Marmore* (Milan: Electa, 1997).
50. Francesco Moschini, 'Mario Ridolfi. L'architettura come pratica artigianale', *d'Architettura*, no. 17 (2002): 188–91.
51. Cellini and D'Amato, *Mario Ridolfi : manuale delle tecniche tradizionali del costruire : il ciclo delle Marmore*, 19.

Biography

Andrea Alberto Dutto (1985) is an architect and a PhD candidate in Architecture at the Turin Polytechnic, in joint partnership with the RWTH University of Aachen, where he is part of 'Werkzeugkulturen' research group. Since 2013 his work has been published in various journals and architectural magazines.

