Leibniz and the Encyclopaedic Project

by
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My talk will have three moments. In a *first moment*, I will try to identify the main determinations of encyclopaedic project in its whole. Since Varro (116-24 b.c.), *Rerum Divinorum et Humanorum Antiquitates*, St. Isidorus (560-636) *Etimologies*, Alsted *Encyclopaedia Omnia Scientiarum* (1630), or Diderot and D'Alembert *Encyclopédie ou Dictionnaire Raisonné des Sciences, des Arts et des Métiers* (1751-1765), to the *Internet* - which constitutes (I will argue) the most recent and eloquent development of the history of encyclopaedism - the aim will be to look for what is common to all this kind of excessive works. In a *second moment*, I will attempt to understand how Leibniz's idea of encyclopaedia inserts itself in that project of all times, what specific place Leibniz occupies within those many attempts. In the *third moment*, I will try to estimate the presence of Leibniz's idea of encyclopaedia in subsequent developments of encyclopaedism, namely in the XX / XXI century. This will be my humble contribution to this Congress whose major purpose is to think out the actuality of Leibniz.

Brief characterisation of encyclopaedic project

Encyclopaedic project can be briefly characterised in nine points. 1) Encyclopaedia aims to become a **complete exposition of all knowledge** conquered by mankind and available at a certain historical moment. This vertigo towards exhaustivity can lead encyclopaedia to a teratological dimension. The case of the immense Chinese encyclopaedias, clear symptoms of the circular, steady character of Chinese culture, is eloquent. See the never ended XV century Yung-Loh Ta Tien with its 11.995 volumes or the T'u Shu Chi Ch'êng, published in Xangai at 1726 with 5.020 volumes of which exists an entire exemplar at the British Museum. However, in occidental world, encyclopaedia is touched by the law of constant innovation that characterises our civilisation and thus it is always designed, not as a complete but as a compact library, an economic work forced to combine exhaustivity with selectivity. In the line of Bacon *Instauratio Magna*, encyclopaedia is assumed as an historical production always incomplete, unfinished, precarious, condemned to the voracity of

knowledge progress: "it does not suppose that the work can be altogether completed within one generation, but provides for its being taken up by another"[1]

2) Encyclopaedia is **not a dictionary.** Dictionaries aspire to be a full, consistent codification of language, even if they can never realise such a design and they all suppose some encyclopaedic openness to the world. On the contrary, encyclopaedia is a structure semantically opened, a representation referring the world of things and events, which are to be spoken, that is, known. Although many encyclopaedias may have been designated as dictionaries (the most celebrated examples are the *Encyclopédie ou Dictionnaire Raisonné des Sciences, des Arts et de Métiers*, by Diderot and D'Alembert and the *Grand Dictionnaire Universel* by Larrousse (1866-1890); although some have in common with the dictionaries the alphabetic presentation of its elements (the case again of Diderot and D'Alembert's *Encyclopédie*, of Larrousse's *Grand Dictionnaire* or Coleridge's *Encyclopaedia Metropolitana* (1817-1845)) – encyclopaedia is never interested in words but in what words mean and refer – the world behind the words[2].

3) If encyclopaedia is never a dictionary, yet they have one point in common. They both are **discontinuous texts** made of independent segments or *entries*, either alphabetically organised or structured in larger conceptual, thematic or disciplinary frameworks. Those semantic fields never present well-defined borders. Each entry opens (explicitly or implicitly) to other entries which, in turn, open to others in such a way that each entry is virtually connected with all others. In that sense, encyclopaedia is not so much a monumental reunion of all knowledge in one closed place, but the free circulation of unity throughout the dense and sensual effectivity of its volumes and pages. Not a static totality but a dynamic entity, not a mausoleum but a "living intellectual force" as Otto Neurath, the big organiser of neo-positivist *International Encyclopaedia of Unified Science* (1937-38) used to say[3]. Not an additive totality but a vast, waving horizon, a *net* of multidimensional elements which can be connected according to multiple relationships. That is to say, encyclopaedia supposes a

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[1] F. Bacon, <u>Instauratio Magna</u>, <u>Preface</u>, in <u>The Works of Francis Bacon</u>, edited by J. Spedding, 1857-1874, London: Ellis and Heath, vol. IV: 21.

[2] That is why encyclopaedia always reflects the cultural and scientific situation in which is created. That is, to actualize an encyclopaedia it is not just to add new entries but to diminish the importance of some and to grow up others. As it is said in the 1974 edition of the Britannica, "if we want to seriously reflect the knowledge situation of nowadays, we cannot dedicate 30 pages to chavelry and 31 to legal status concerning pornography" (<u>Encyclopaedia Britannica,</u> (1973-74), <u>Preface</u>, vol. I: XIII).

[3] I quote Neurath from his famous "Unified Science and Encyclopaedic Integration": "a living being and not a phantom, not a mausoleum or an herbarium, but a living intellectual force", "Unified Science and Encyclopaedic Integration", in O. Neurath (ed.), <u>International Encyclopaedia of Unified Science</u>, Chicago/Illinois: The University of Chicago Press, 1938, vol. I: 26.

deep, floating continuity underlying its superficial discontinuity. This is the point in which encyclopaedia most clearly revels itself as a strong configuration of the unity of science. In fact, it is the only attempt of unification of knowledge, which is effectively realised, the only material realisation of unity of science that condenses and presents to the eyes of everybody a large scope of materials, which could never be confronted in any other way.

4) So, the material objectivity of encyclopaedia has an **unlimited condition**. The finite member of its pages contains a net of discrete elements which can be articulated according to multiple relations in an undetermined number of combinations – a kind of combinatory without rule. A situation which offers its readers the possibility of making their own *journey of reading* according to their interests and preferences. Something, which has been much improved by recent technical developments of electronic encyclopaedias and hypertext but which encyclopaedia has always pointed to. In fact, encyclopaedia does not only offer that possibility but also promotes it, inviting the reader to take his own course. How? Suggesting different courses of reading, proposing a set of resources (indexes, thesaurus) which look for inviting the reader to actualise one of the many possibilities it offers, multiplying internal references, cross-connections, articulations, those instantaneous electronic links which today characterise hypertext and Internet as its extension.

5) That discontinuous nature of encyclopaedia is reinforced by the fact that it frequently includes **non-linear materials** such as pictures, drawings, diagrams, prints, illustrations, maps, statistics, plans, schemes, photographs and tables of all types. See the case of the more than 600 pictures and the eleven complementary volumes of illustrations of Diderot' s *Encyclopédie* published along ten years, from 1762 to 1772. See also the case of Leibniz claim of an *Atlas Universalis* containing various kinds of maps and tables, from geography, astronomy and topography to heraldic, genealogy, music, architecture, hydraulics, pharmacology or agriculture (cf. C: 222-224). That is to say, encyclopaedia points to the semantic exploration of the diagrammatic resources of language putting them at the service of the iconic, imagetic, cartographic description of the world. We understand the close connection between encyclopaedia and museum which, by its side, can be considered as a physical manifestation, a sensitive realisation of encyclopaedia. In other words, encyclopaedia tends to recover the idea of museum. Its pages answer the display-windows of a universal museum. They both are "seeing machines". Something which - again - with the new technological conditions, from electronic encyclopaedia to Internet itself, is being strongly reinforced.

6) Encyclopaedia always has a strong hope in its **cultural, educative role**. That is why encyclopaedia is somehow coextensive to illuminist project. Is true that, inviting the reader to follow his own *cursus*, encyclopaedia is never didactical, never a student's manual. The reader is not exactly a student, not a pupil, someone who intends to follow a pre-determined *curriculum* in order to obtain a systematised knowledge. Neither is he a self-taught person – caricature (and victim) of the encyclopaedia reader, someone who forcedly and naively tries to substitute school's linearity by the combinatory regime of encyclopaedia[4]. The reader of encyclopaedia is always an already lettered public – a "publique éclairé" as Diderot and D'Alembert say[5], a "curious and intelligent reader", as stated in the *Preface* of the *Britannica*[6]. However, encyclopaedia always supposes the constitution of a large knowledge community whose limits ideally coincide with the entire humanity with which encyclopaedia intends to share knowledge. In Leibniz words, encyclopaedia is a " trésor publique qui seroi d'un usage incomparable dans tous les besoins de la vie" (GP 7: 158).

7) Further, encyclopaedia is a **collective work.** It is true that some works, which today can be retrospectively included in the gender of encyclopaedia, were made by one only author. That is the case of Varro's *Rerum Divinorum et Humanorum* (I b.c.), of Plineo's *Historia Naturalis* (I), of those medieval works like Isidorus *Etimologies* (VI) or Vincent de Beauvais *Speculum Majus* (XIII), and those many Renaissance and Barroque encyclopaedias like Domenico Delfini *Summario di tutta Scienza* (1556), Luis Vives *Tradentis Disciplines* (1531), Comenius *De Rerum Humanorum Emendatione Consultatio Catholica* (1642-1670). That is also the case, in the XVII century, or Pierre Bayle *Dictionnaire Linguistique et Critique* (1647-1706), a work which Leibniz criticises for many reasons but also for that underlying will of doing everything by its own hands which crosses Bayle's project. However, with some exceptions[7], from XVIII century on, encyclopaedia supposes the collaboration of different competencies: half a dozen of celebrated science men like John Ray and Newton in the case of John Harris *Lexicon Thematicon* (1704); many celebrated experts together with unknown, unidentified, even anonymous collaborators like in

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[4] That is the tragedy of the extraordinary work of Flaubert <u>Bouvard et Pécouchet</u> (1880), the unwise adventures of two heroes taken by encyclopaedist passion who succumb the labyrinth of knowledge mostly, we would say, by absence of an ordered plan of studies.

[5] See, for instance, D'Alembert, <u>Discours Préliminaire de l'Encyclopédie</u>, Paris: Gonthier, 1965: 143.

[6] <u>Encyclopaedia Britannica</u> (1973-74), <u>Preface</u>, vol. I: XV.

[7] For instance, the <u>Encyclopaedia Metropolitana</u> de Coleridge (1817-1845) or Hegel's <u>Enzyklopädie der Philosophischen Wissenschaften</u> (1817).

the case of Diderot's *Encyclopédie*[8]; various identified authors presenting their controversial perspectives as was put in practice in the XX century[9]. As Neurath says, in encyclopaedia "scientists with different opinions will be given an opportunity to explain their individual ideals in their own formulation"[10] in such a way that "encyclopaedia will become a platform for the discussion of all aspects of scientific enterprise" (*ibid*: 26). That is, from one's voice discourse, encyclopaedia becomes a plural, polimorphic "orchestra" as Neurath used to say[11].

8) Collective work, encyclopaedia is never an amount of discontinuous elements coming from different sources, never a miscellany but an **ordered presentation**. As Leibniz says, "l' encyclopédie est un corps oú les connaissances humanise les plus importants sont rangées par ordre" (GP 7: 40). Implicitly or explicitly, it always supposes a "systhème figuré des connaissances humaines", a *mapamundus* where the *order* and *connection* of human knowledge can be discovered. That order and connection can be distributed by the thematic or disciplinary arrangement of its elements. It can even be cancelled by the alphabetic presentation of its entries. But the systematic structure is there and it is that structure which determines both the quantity and quality of the entries, the inclusion or exclusion of certain topics as well as the settling, the articulation, the relative importance of some entries towards others. That does not mean that encyclopaedia should be endowed with a systematic perspective, a constraining point of view. It happens scarcely, for instance, in the case of Hegel' s *Enzyklopädie der Philosophischen Wissenschaften* (1817). What it means is that encyclopaedia has an undeniable synthetic vocation. Its aim is to show the circle of knowledge, the unity and harmony of its branches. And that is true even if the reunion is assumed as provisory and opened to the empirically grounded knowledge.

9) At last, encyclopaedia has always a **prospective role**. By establishing cross-connections, by doing local systematisations, by promoting terminological unification, by taking into practice co-operative articulation, encyclopaedia reveals itself as an *organon* at the service of science progress. Further, by synthesising the already known, by showing the gaps in our present knowledge,

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[8] The Encyclopédie had in fact the colaboration of first level science men, artists, musicians, writers like Quesnay, Rousseau, Voltaire, Du Marsais, Turgot, Montesquieu, Grimm or Duclos, side by side with craftsman, agricultures, gardners, weavers, etc. and even many spontaneous and sometimes anonimous "coleagues", all united by a militant "intéret général du genre humain et par un sentiment de solidarité reciproque" as Diderot says in the entry "Encyclopédie" (Ouevres complètes de Diderot, Paris: Robert Lafont, 1994: 368).

[9] Around 4000 in the case of the 15th edition of the Britannica. Cf. Encyclopaedia Britannica (1973-74), Preface, vol. I: XVIII.

[10] Neurath, "Unified Science and Encyclopaedic Integration", p. 25.

[11] O. Neurath, "The orchestration of the Sciences in the Encyclopaedism of Logical Empiricism", Philosophy and Phenomenological Research (1946), VI, 4: 505.

encyclopaedia gives us to know what is not yet known. In Francis Bacon words, encyclopaedia "must take into account not only things already invented and known, but likewise things which ought to be there. For there are found in the intellectual as in the territorial globe waste regions as well as cultivated ones"[12]. And D'Alembert, in the celebrated *Discours Préliminaire* (1751), indicates the way on which encyclopaedia should present itself to its readers: "Voila le peu que vous avez appris, voici ce qui vous reste à chercher"[13]. Encyclopaedia - we could say - intends to reduce the opposition between memory and invention.

Specificity of Leibniz conception of encyclopaedia

Leibniz *idea* of encyclopaedia fulfils all the requirements we have signalised to characterise the encyclopaedic project in its whole however giving special importance to some of them. In fact, Leibniz is fully aware that encyclopaedia is not an exhaustive exposition of all knowledge. Librarian and archivist as he was, Leibniz knew quite well that what is important is not to put library within encyclopaedia but, on the contrary, as he says: "il faut qu' une Bibliothèque soit une Encyclopédie"[14]. Library itself should obey a criterion of order and selectivity, a method able to preserve what is really relevant. From that "horrible masse de livres qui va toujours augmentant" (GP 7: 160), from that "multitude des auteurs qui deviendra infini en peut de temps" (*ibid*.), it is necessary to extract the "quintessence", "joindre les meillheurs observations" (GP 7: 162). Encyclopaedia is precisely that devise able to order the disperse and chaotic information, to abolish redundancy, repetitions, inutilies in order to save the most consistent thoughts and experiences reached by mankind throughout the centuries[15].

Also Leibniz is fully aware that encyclopaedia is not a dictionary. Sometimes he refers it as a general inventory, an "Inventaire Générale" (GP 7: 158). But he points out clearly that it is an inventory of knowledge and not of words, an "inventaire exact de toutes les connaissances acquises

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[12] F. Bacon, The Plan of the Work, in The Works of Francis Bacon, edited by J. Spedding, vol. IV: 22-23.

[13] D'Alembert, Discours Préliminaire de l'Encyclopédie, p. 91.

[14] Cit. in L. Couturat, La Logique de Leibniz d'apres des Documents inédits, Hildesheim: Georg Olms Verlag, 1961: 573.

mais dispersés et mal rangées" (C: 228). In spite of being a continuos body, knowledge can be presented in a terminological order, a disposition in which it is arranged "suivant les termes" (GP 5: 506)[16]. But, on doing so, we all will easily realise that Logics should be the basis for constructing that inventory. As Leibniz stresses in the *Nouvelles Ouvertures*, "La science générale qui doit donner non seulement le *moyen* de se servir des connaissances aquises mais encore la *méthode* de juger et d' inventer à fin d' aller plus loin et de suppléer à ce qui nous manque (...) Cette science générale serve encor à faire bien dresser l' inventaire (des connaissances humaines) et c' est par elle qu' il faut commencer" (C: 228-229). That is, for Leibniz the ideal situation would be to begin by developing the "Scientia Generalis", a science able to give the rational ground of all particular sciences, to establish their demonstrative articulation. Then, it would be possible to present all propositions in the clear and simple way used by geometers, "les rangées selon l'ordre de leur dépendance" (GP 7: 158), in such a way that "l'une se demonstreroit par l'autre, pourveu qu'on se gardast de faire des sauts" (*ibid.*). Leibniz ideal would be to built an "Encyclopaedia demonstrativa" (GP 7: 168), a kind of Euclidean work - "Élements démonstratives de toutes les connaissances humaines" (*ibid.*)[17]. As he says, "l'ordre scientifique parfait est celuy, où les propositions sont rangées suivant leurs démonstrations less plus simples, et de la manure quells nascent less unease Des actress" (GP 7: 180). However, that order is not yet known. It will be discovered as long as science will progress. That is the reason why "les sciences s'abregent en s'augmentant" (GP 7: 180). That is the reason why "plus une science est perfectionée, et moins a-t-elle besoin de gros volumes"(*ibid.*).

In the meantime, "car il faut tousjours tacher d' avancer nos connaissances" (GP 7: 165), we must start with what we have. In Leibniz words: "cependant, lors mêmme qu'on peut arriver à ces Elemens accomplies, les systémes plus entendus ne sont pas a négliger" (GP 7: 180). We can look for "quelque chose d'approchant qui vaudroi mieux, sans comparaisons que la presente confusion" (C: 229). That is what Leibniz explains in the last chapter of the *Nouveaux Essais*: in the meantime, encyclopaedia can be the ordered presentation of the different areas of the ocean of sciences according to three great dispositions: a synthetic and theoretic order where propositions will be

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[15] "Il se trouve par cy par là une infinité de pensées belles et solides dans les méditations des habiles gens, et une infinité d'expériences et adresses importants et curieuses parmy les gens de mestier et dans ceux qui font profession particuliaire de quelques sciences et arts" (GP 7: 159).

[16] In that way, encyclopaedia will become "une espèce de *Repertoire*, soit systematique, rangeant les termes selon certains predicamens qui seroient communs à toutes les nations, soit alphabetique selon la languya receue parmy les scavans" (GP 5: 506).

arranged "selon l'ordre des preuves" (GP 5: 506) as in mathematics, an analytic and practical one, which will follow the empirical order of men' s needs, and the already mentioned disposition "suivant les termes" (GP 5: 506) which would give a kind of "Repertoire", either systematic or alphabetically organised[18]

Those three arrangements of the same truths (cf. GP 5: 507), having each one its own value (cf. GP 5: 506), should be used together in such a way that it would be possible to establish internal articulations, references and returns. As Leibniz states, encyclopaedia should have "beaucoup de renvois d'un endroit à l'autre, la pluspart des choses pouvant être regardées de plusieurs faces" (GP 7: 180). We know that what is underlying this possibility is Leibniz' s perspectivism, the fact that "une mêmme vérité être placée en differents endroits" (NE, GP 5: 505)[19]. That is to say, for Leibniz, encyclopaedia continues to be a *Speculum Majus* of the unity of science, a realisation of the harmony between the exhaustive categorisation of knowledge and the metaphysics of the objects of that knowledge. That is why Encyclopaedia is, after all, an aesthetic experience. It give us to contemplate "la belle harmonie des vérités (...) dans un systéme réglé (qui) satisfait l'esprit bien plus que la plus agréable Musique et sert sur tout à admirer l'auteur de tous les Estres, qui est la fontaine de la verité, en quoy consiste le principal usage des sciences" (GP 7: 180).

Also Leibniz is fully aware that encyclopaedia must be a collective work. Dealing with the entire body of knowledge, encyclopaedia cannot be "l'entreprise d'un seul homme, ny même de peu de personnes" (C: 229). This is a point mush emphasised by Leibniz and, most of all, an absolute novelty for his time. In fact, all the encyclopaedism previous to Leibniz (antique, medieval, renaissance and baroque) was of unique authorship. Of course, those encyclopaedic intents had resource in previous materials. But they were designed, organised and produced by one only author. Now, with Leibniz - following in this respect the programmatic indications put forward by Francis Bacon, *Instauratio Magna* (1620) - encyclopaedia should be undertaken by the very science man who are responsible for the progress of sciences: "ce qui pourrait nous aider le plus, ce seroit de joindre nos travaux, de les partager avec avantage et de les regler avec ordre" (GP 7: 157-158).

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[17] As Leibniz says some pages before, "Insensiblement, on formeroit des *Elemens* de toutes les connaissances que les hommes ont déja acquises, qui n'iroient pas moins à la posterité que ceux d'Euclide et les passeroient même incomparablement" (GP 7: 158).

[18] Cf. NE, GP 5: 506 and also *supra*, note 18.

[19] A little further, Leibniz states: "une même verité peut avoir beaucoup de places selon les differens rapports qu'elle peut avoir" (GP 5: 506). And, establishing an interesting connection between Encyclopaedia and library, he writes: "Et ceux qui rangent une Bibliothèque ne scavent bien souvent où placer quelques livres, estant suspendus entre deux ou trois endroits egalement convenables" (*ibid.*).

Encyclopaedia supposes the co-operation of scientist of all areas, with no distinction of nationality or religion, organised in academies which, as we know, Leibniz tries hardly to create, true "scientific orders"[20] capable to fight against savage proliferation, disciplinary terrorism, able to overcoming sterile quarrels and animosities, "discours speciaux" (GP 7: 160), futiles disputes, "une *république des lettres* oú tout conspire à la perfection de l'esprit et á l'avantage du genre humain" (C: 228).

Further, the collective character of encyclopaedia can also be seen in the fact that encyclopaedia always supposes the consideration of previous endeavours, even of those "connoissances non-ecrites qui se trouvent dispersées parmy les hommes de differentes professions" (GP 7: 181). Encyclopaedia recognises what we owe to all predecessors and takes it as its starting point. That is to say, encyclopaedia is a deeply anti-Cartesian design. It does not makes *tabula rasa* of previous attempts, it never intends to begin from zero by methodologically putting in doubt all the knowledge coming from the past, nor it is the work of a meditative singularity. On the contrary, encyclopaedia supposes "le travail de plusieurs" (GP 7: 168) in the thickness of institutional frames devoted to the acquisition and communication of truth.

And thus we came to the last point in this brief characterisation of the specificity of Leibniz conception of encyclopaedia: its heuristic value, probably the most meaningful feature of Leibniz encyclopaedism. As Leibniz states, "le principal est que la reveue exacte de ce que nous avons acquis faciliteroit merveilleusement des nouveaux acquest" (GP 7: 159). That heuristic capacity of encyclopaedia has in Leibniz three levels. At a first level, in general recognised by all encyclopaedic projects, encyclopaedia operates as a *revealer* of future investigations. As Leibniz writes, making use of the territorial metaphor proposed by Francis Bacon "en découvrant tout d'une veue toute cette region d'esprit déja peuplée, on remarqueroit bientot les endroits encor négligés et vuides d'habitants. La Géographie des terres connues donne moyen de pousser plus loin les conquestes de nouveaux pays" (GP 7: 158-159). And, in a prophetic style, again much close to the Bacon's utopia, he adds: "On envoyeroit des colonies pour faire des plantations nouvelles dans la patrie la moins cunnue d'Encyclopedie" (GP 7: 159). At a deeper level - something which exclusively Leibniz has understood and thematised - encyclopaedia acts as an *accelerator* of new knowledge, that is, a combinatory devise which Leibniz comes to think out almost as an heuristics of the unforeseeable and of the analogy on the basis of a metaphysics of infinite inter-expression. In fact, because

[20] See "Rêve de transformation monastique" (J. Baruzi, Leibniz et la Organization Religieuse de la Terre, Paris: Felix Alcan, 1909: 230-231) where Leibniz conceaves the possibility of criating "scientific orders" according to the

knowledge has a fundamental continuity, because each truth expresses all other, it is possible that episodic arrangements, casual appointments can lead to new knowledge. "Et comme il y a des mers inconnues, ou qui n'ont été navigées que par quelques vaisseaux que le *hasard* y havait jettées, on peut dire de même qu'il y a des sciences dont on a connu quelque chose *par rencontre* <seulement> et *sans dessein*" (C: 531, our emphasis). We are face to face to a crucial point of Leibniz' s project of encyclopaedia. A feature which simultaneously reveals the proximity of Leibniz to Rámon Lull and his pioneer idea of a combinatory heuristics. We know that Leibniz could not accept, neither the list of the Lullian categories[21], nor the mechanical combinatory methods set up by the Catalan thinker[22]. But we cannot forget how much Leibniz praised Lull for his recognition of combinatory as the ground for *ars inveniendi*[23]. And we cannot forget that the *De Arte Combinatoria*, is one of the most fruitful proposals of combinatory calculus of all the history of mathematics. However, there is yet a third level in what concerns the heuristic capacity of encyclopaedia in Leibniz - that of a *demonstrative heuristics* - the fact that, ultimately, all invention will one day become demonstrative and analytical. As Leibniz says, "en examinant chaque science, il faut tacher d'en decouvrir les principes d'invention, lesquels estant joints à quelque science supérieur, ou bien à la science generale ou à l'art d'inventer, peuvent suffire à en déduire tout le reste" (GP 7: 168). Now, it is the demonstrative structure of encyclopaedia that revels itself in its heuristic potentialities. That is why, as Leibniz stresses, "quand même nous aurions une Encyclopédie démonstrative entiérement achevée (...) on pourrait donner le moyen de trouver toujours les consequences des vérités fondamentales ou des faits donnés par une manière de calcul" (GP 7: 168). Seeing the systematic character of all knowledge, all invention will one day become demonstrative because all production of new knowledge will come from analytical procedures: pure calculus. Leibniz is very explicit in the next very interesting passage: "With the passage of time, certain operations which were once combinatorial will become analytic (...) for the analytic art, which - in its correct and general use - is

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model of religious communities.

[21] Which, since the <u>De Arte Combinatoria</u>, appear to Leibniz as arbitraraly choosed (cf. GP 4: 62-63). See also C. 177. As we know, for Leibniz, combinatory supposes the constituion of an alphabet of human thoughts, a set of primitive terms or *summa genera* of which Leibniz never gave a definitif list. Cf. for instance, <u>De Synthesi et Analysi universali seu Arte inveniendi et judicandi,</u> GP 7: 292-298.

[22] For Leibniz's criticism of the insufficient and rudimentary character of the mechanical procedures proposed by Lull (instead of which he presents in <u>De Arte</u> calculatory procedures of mathematical analysis), cf. GP 4: 62-63. See also GP 7: 293.

[23] For that reason, in the famous <u>Projet et Essais pour arriver à quelque certitude pour finir une bonne partie des disputes et pour avancer l'art d'inventer</u>, Leibniz included Lull, together with Aristotle, Galileu, Kepler, Descartes and Spinoza, in the list of his predecessors in the search for a non-mathematical system of demonstration, cf. C: 177 ff. See also GP 3: 619.

still virtually confined to mathematics, will become universal and applied to every type of matter through the introduction of a scientific notation or 'philosophical character' such as the one in which I am working on "[24]. And Leibniz goes on and concludes: "Furthermore, if there will be also a trustworth catalogue (...) written in the same characters, together with the more important theorems (...) derived from the characters alone or with observation data, it will come that the art of combination will lose its glory"[25] (*ibid.*).

Presence of Leibniz in subsequent developments of encyclopaedism

Let me now came to the last point of my talk - the attempt to discover the presence of Leibniz in posterior encyclopaedism. Face to the obvious impossibility of even mention the most relevant situations in which Leibniz is taken as the proclaimed predecessor (see the case of Diderot and D'Alembert who explicitly recognise their debt towards Leibniz[26]), I will choose solely two examples: 1) *the International Encyclopaedia of Unified Science* (1938) designed, planified and edited mainly by Otto Neurath, that tireless inspirer of the logical-positivist movement for the Unity of Science, and 2) the Internet as the most recent realisation of encyclopaedic project.

1) The proximities between Neurath and Leibniz' encyclopaedism are many and especially interesting because they give us to see one last and crucial feature of the specificity of Leibniz encyclopaedism.

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[24] "Unde tractu temporis quaedam operationes quae erant antea combinatoriae, fient analyticae (...) arte analytica quae nunc vix in mathematicis satis recte et generaliter adhibetur, universali reddita, in omni materiarum genere, introducto charactere philosophico, qualem molior" (C: 168).

[25] "Praeterea si catalugus historiam, sive <relationum>, observationum, experimentorum fidelis eodem charactere scriptus accedat; et <majoris momenti> theoremata (...), ex charactere vel solo vel cum observationibus ducta, adjiciantur; fiet, ut artis quoque combinatoriae laus peritura sit" (*ibid*).

[26] Mainly in his methaphisics of continuity, but also by "la grandeur de ses vues en toute genre, l' étendue prodigieuse de ses connaissances, et surtout l'esprit philosophique par lequel il a su les écairer" (D'Alembert, <u>Discours Préliminaire de l'Encyclopédie</u>, p. 103). That is why, as D'Alembert writes, "Leibniz, de tous les savants le plus capable d'en sentir les difficultés, désirait qu'on les surmontât. Cepandant on avait des Encyclopédies, et Leibniz ne l'ignorait pas, lorsqu'il en demandait une", *op. cit*., p. 123.

They both were penetrated by a militant attitude towards unity of science and, for both, encyclopaedia was the realisation of unity of science it self, " the model of man's knowledge"[27], that is, for both it was through encyclopaedia that philosophy could reach its aim as exhaustive knowledge of the world and its unity.

They both though out encyclopaedia as a collective and opened work to be historically realised by the co-operation of scholars connected in scientific institutions which where yet to be invented in the time of Leibniz and reinvented in the time of Neurath[28], that is, they both were patient and pragmatic organisers, dominated by the will of constructing a community of knowledge by means of designed co-operative forms. For both, encyclopaedia supposes the co-operation of scientists throughout the world. That is, they both stressed the universalistic spirit of their projects, irenical in the case of Leibniz, internationalist in the case of Neurath: "The maximum of co-operation - that is the program!"[29],

For both encyclopaedia is coextensive with illuminist philosophical project itself: "it will become a platform for the discussion of all aspects of the scientific enterprise (...), a living intellectual force growing out of a living need of men, and so in turn serving humanity" (*op. cit.,* p. 26). For both, encyclopaedia has a major prospective role, both in its practical, ideological, political, educative aims and in its heuristic value. By putting together the several disciplines, by overcoming their "speculative juxtaposition"[30], by showing the "gaps in our present knowledge and the difficulties and discrepancies which are found at present in various fields of science"(*op. cit*., p. 25), by "analysing concepts which are used in different sciences" (*op.cit*., p. 18), by comparing their argumentation (cf. *op. cit*., p. 14), by "considering all questions dealing with classification, order, etc." (*op. cit*., p. 18), encyclopaedia allows scientists to "built up systematic bridges from science to science" (*ibid*) in such a way that "advances in one will bring about advances in the others" (*op. cit*., p. 24). That is, for Neurath as for Leibniz, encyclopaedia is a kind of an *organon* at the service of science progress and search for the truth.

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[27] O. Neurath, "Unified Science as Encyclopaedic Integration", p. 20. Cf. also O. Neurath, "L' Encyclopédie comme modèle", Revue de Synthèse, XII, 2: 187-201.

[28] See Leibniz' s major role in the movement of raising academies and scientific journals and Neurath' s many initiatives towards the neo-positivist "Unity of Science Movement" as Neurath himself says (Erkenntnis, Mundanaeum Institute, International Congresses for the Unity of Science). Cf. for instance, O. Neurath, "Unity of Science Movement. After six years", Sinthèse, 5: 77-82.

[29] O. Neurath, "Unified Science as Encyclopaedic Integration", p. 24.

[30] O. Neurath, "Unified Science as Encyclopaedic Integration", p. 20.

Finally, they both - and this is perhaps the main point of approach between Leibniz and Neurath's encyclopaedism - gave special attention to the construction of a scientific language in parallel with the construction of encyclopaedia. Belonging to the history of language reformers, they both wanted to reach unity of science through the interaction between encyclopaedia and unified scientific language. Like Leibniz, Neurath recognises that unity of science, and encyclopaedia as its institutional *correlatum*, supposes the constitution of a unified scientific language: "the first step of our Unified Science as an Encyclopaedia is that we 'ackowledge' the elements of our Universal Jargon"[31]. And he praises Leibniz precisely because he was "the first and last of the great philosophers who planned seriously to work out a comprehensive calculus adequate for all scientific progress"[32] and because Leibniz "planned to organise a large encyclopaedia (...) in close connection with his *Characteristica Universalis*" (*op. cit*., p. 16).

It is true that the most important leibnizian project of a scientific language is the *Characteristica Universalis*, an *a priori* design which, of course, was far from Neurath' s anti-systematic intents[33], anti-pyramidal, to use his own terms[34]. But it is also true that there is in Leibniz two other projects of constructing a philosophical language[35] - the *a posteriori* project coming from Latin, and the reform of a natural language (German) - which are very near from Neurath' s project of a *Universal Jargon*, a project aiming to express science by ordinary, natural languages, reinforced in their vocabulary with scientific terms[36]. Further, even the *a priori* project of a *Characteristica Universalis* is not thought out by Leibniz as *previous* to the construction of the encyclopaedia, directing the construction of encyclopaedia as if from the top of a pyramid as Neurath would fear. The *Characteristica universalis* must be developed in parallel with the *Encyclopaedia universalis.* As Leibniz reply to Descartes, "quoique cette langue depende de la vraye philosophie, elle ne depend pas de sa perfection. C' est à dire, cette langue peut être établie quioque la philosophie ne soit pas parfaite et à la mesure que la science des hommes croistra, cette langue croistra aussi" (C: 28). What Leibniz proposes is to explore the development of encyclopaedia and *characteristica* in a kind of zigzag articulation. If, by one side, the construction

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[31] O. Neurath, "The Orchestration of the Sciences by the Encyclopaedism of Logical Positivism", p. 501.
[32] O. Neurath, "Unified Science as Encyclopaedic Integration", p. 15.
[33] As Neurath stresses, "the anticipated completdness of the system is opposed to the stressed incompletdeness of encyclopaedia", "Unified Science as Encyclopaedic Integration", p. 21.
[34] Cf. O. Neurath, "The Departmentalisation of Unified science", Erkenntnis., (1937-38). VII: 240-246.
[35] For a comprehensive development of this point, cf. O. Pombo, Leibniz and the problem of a Universal Language, Münster: Nodus Publikationen, 1987.

of a philosophical language supposes the analysis of the main concepts and the elaboration of definitions that is, all encyclopaedia, on the other side the symbolic transposition of the cognitive contents and its inclusion on the net of signs already constructed facilitates the advancement of encyclopaedia. By revealing the diverse regions of science, encyclopaedia makes it easy the analytical decomposition of terms. But, inversely, the use of a symbolic system able to express the various ideas and its relations, leads to the exhaustive analysis of those ideas, and thus, to its definition and systematic articulation, that is, helps the constitution of encyclopaedia. The implication between *characteristica* and encyclopaedia is so deep that, as Leibniz writes, "La Charactéristique que je me propose ne demande qu' une espèce d' Encyclopédie nouvelle (...) Cette Encyclopaedie estand faite selon l'ordre que je me propose, la characteristique seroit quasi toute faite" (GP 7: 40).

2) Just a few words concerning the place Leibniz occupies in the present (and the future) of encyclopaedism.

In this respect, it is necessary to call attention to the fact that, in the second half of the XX century, face to the accelerated progress and exponential specialisation of scientific knowledge and face to the enormous (see monstrous) growing up of information and data, we could think that encyclopaedism would be condemned to disappear. On the contrary - and surprisingly - we assist to a revival of the idea of encyclopaedia, to the renewal of its purposes, to the reinvigoration of its structure, to the development of its potentialities (let me just refer some important encyclopaedias as the Universalis (1968-1975), the last editions of the Britannica (from 1973-74 on) or the Einaudi (1977-1984)). A tendency reinforced by the new technical conditions which are opening new possibilities to encyclopaedism, namely electronic encyclopaedia, hypertext and Internet, the ideal limit of encyclopaedia.

Now, what is interesting to stress is that those new technical possibilities have been prepared by recent developments in the traditional - I mean, literary and textual - form of encyclopaedism. I cannot demonstrate here this topic. It would suppose the retrospective study of the tendencies of encyclopaedism in the last 40 hears as well as the (prospective) study of the passage from text to hypertext and the implications of those developments in encyclopaedism. Let me just signalise some recent issues of XX century late encyclopaedism: the abandon of alphabetic order, the refusal of an

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[36] Cf. for instance, O. Neurath, "The Orchestration of the Sciences by the Encyclopaedism of Logical Positivism", pp. 499-500.

additive model, the progressive approach to a thematic and integrated structure, the deepening of the heuristic purpose of encyclopaedia, the investment in the construction of combinatory mechanisms able to promote the free circulation in the interior body of the encyclopaedia - relation tables in the Universalis, rotate circles in the Britannica, areas of reading in the Einaudi[37] - that is, combinatory devices which clearly announce the curiosity of navigation[38] in the electronic encyclopaedia and Internet.

What further is interesting to stress is that these tendencies - coming from the recent developments of encyclopaedism and the new technical possibilities - appear as the **deepening of Leibniz conception of encyclopaedism**, namely its fundamental *heuristic aim*, the *combinatory regime* of encyclopaedia in its whole, and the *monadological metaphysics* which underlies the isomorphism encyclopaedia seeks to establish between the unity of knowledge and the unity of the world which is to be known.

Because knowledge has no limits, because knowledge is a multidimensional, organic unity, all the delimitations we introduce are in permanent connection, in fluid relationship. That is the meaning of that most celebrated - and quite actual - leibnizian metaphor of encyclopaedia as the *Speculum Majus* of the unity of science: "Le corps entier des sciences peut estre consideré comme l'ocean, qui est continué partout, et sans interruption ou partage, bien que les hommes y conçoivent des parties, et leur donnent des noms selon leur commodité" (C: 530-531).

Apart from arbitrary, institutional borders, encyclopaedia points to the infinite co-expression of the diverse areas of the ocean of knowledge[39]. Each of its elements is a "nouvelle ouverture" opening to all others. We could almost say that each monad is a virtual encyclopaedia.

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[37] In fact, the "Tableux de Rélations" of the Enciclopaedia Universalis are constructed on the basis of seven combinatory elements, three types of modalities and four kind of relations. Cf. Enciclopaedia Universalis (1968-1975), Chicago / London / Toronto / Genève / Sydney / Tokyo / Manila / Seul: Encyclopaedia Britannica Inc., vol. XVII: 623. For the "circles" of the Britannica, see The New Encyclopaedia Britannica (1973-1974), Propaedia: 5-7. For a detailed presentation of the "areas of reading" of the Einaudi, their intricacy and their mutual influence, cf. the Introduzione by Renato Betti, Enciclopedia Einaudi, vol. XVI: 11-36, Torino: Guilio Einaudi Editore.

[38] The concept of "navigation" appears explictly at the Organon of the Enciclopaedia Universalis, vol. XVII: 595.

Finally, I would like to stress is that this recent renewal of interest in encyclopaedia does not really constitute such a big surprise. The more complex is the labyrinth of knowledge, the more is needed the presence of encyclopaedism as unifying activity. In fact, the progress of sciences and the deepening of its specialisation do not empty the place as encyclopaedism. On the contrary, its patient task - as cartographic, unifying activity - becomes more and more difficult but also more and more urgent and necessary.

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    Apparently labyrinthine but in fact regulated by a
regime of compossibility, encyclopaedia continues to work
out the ideal of Unity of Science. Because it is not
dominated by the idea of a systematic closeness but, on the
contrary, accepts the risks of wandering, encyclopaedia
gives us to see how little we know about the world. But
simultaneously, it makes us refuse the feeling of being lost
and it encourages walking the ways of inquiry.
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[39] "(...) un Ocean qui est tout d'une pièce et qui n'est divisé en Caledonien, Atlantique, Aethiopique, Indien, que par des lignes arbitraires", (NE, GP 5: 505).