Chapter 3

The Universal Language

1. Leibniz did not initially conceive of his characteristic as an algebra or calculus—doubtless because he was still "a novice in mathematics"[1]—but rather as a universal language or writing. This, in fact, is the first application he makes of his logical invention in *On the Art of Combinations*.[2] It was no doubt suggested to him by various contemporary projects for a universal or international language, which he enumerates following Caspar Schott. One of these projects was conceived by an anonymous Spaniard (also cited by Kenelm Digby[3]) who had been in Rome in 1653. He had organized "things" (or concepts) into several classes and had numbered the classes and the concepts in each of them. He then designated each concept by the number of its class and its number in that class. It is interesting to note that he was obliged to add to this two-digit number certain signs that would replace grammatical inflections and serve as a syntax (just as Leibniz was obliged to employ articles and prepositions in his attempt at a geometrical characteristic[4]); this shows that he had not analyzed the relations of concepts and did not know how to translate them into symbols.

Another attempt at a universal language was made by Johann Joachim Becher, a physician from Mainz.[5] He had simply numbered (in alphabetical order) all the words in a Latin dictionary and created dictionaries in different languages in which the words were arranged according to the order of their numbers. In this way he established a correspondence between the vocabularies of different languages, so that a text written in numbers could be read and translated at will into any language by means of the corresponding lexicon.[6]

Finally, the third attempt Leibniz cites is that of Athanasius Kircher[7] who had already had the idea of employing the art of combinations in his plan, though (as we shall see) in a far cruder fashion. He had composed a double dictionary in five languages (Latin, Italian, French, Spanish, and German). The first dictionary was intended for composition: the words of each language were arranged in alphabetical order and opposite each was found its translation into numbers. The second dictionary was intended for translation: the corresponding words of the five languages (those having the same meaning) were

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[1] Leibniz to Gabriel Wagner, 1696 (Phil., VII, 522).

[2] "From the things we have discussed concerning the art of complication of the sciences, or the logic of invention... there follows as a corollary Application XI: a universal writing, that is, one intelligible to anyone reading it, no matter what language he is familiar with." *On the Art of Combinations*, §89 (*Phil*., IV, 72; *Math.,* V, 49).

[3] Kenelm Digby (1603-1665), a Cartesian philosopher who was exiled from England for political reasons and spent the greater part of his life in France. See Leibniz's comments about him in *Antibarbarus Physicus* (*Phil*., VII, 343) and the texts quoted in Note I.

[4] See Note VI.

[5] *Character pro notitia linguarum universali* (Frankfurt, 1661).

[6] Concerning Becher's project, see LH IV 7B, 3 Bl. 13.

[7] *Polygraphia nova et universalis, ex combinatoria arte detecta* (Rome, 1663). Book I: "The Reduction of All Languages to One, Containing the Double Dictionary of Five Tongues." Books II and III are dedicated to various systems of cryptography inspired by Trithemius.

arranged on the same line in five parallel columns (according to the alphabetical order of the Latin words); when the lines on each page and the pages themselves were numbered, each word (or concept) was designated by the number of its page (in Roman numerals) and the number of its line (in Arabic numerals).[8] If necessary, a sign or letter indicating the inflection of the word (for nouns, the case and number; for verbs, the voice, mood, tense, number, and person) were added to these two numbers. By means of this system—analogous to that of the anonymous Spaniard but more artificial—a text from any one of the five languages could be translated into numbers and, conversely, a text written in numbers could be translated with equal ease into any of the five languages.[9]

In an unpublished fragment, Leibniz summarizes an earlier project of Kircher, which appears to be an outline for the preceding one.[10] The dictionary (in only one language) consisted of nine folio pages; each of these contained six columns, yielding 54 columns in all. Each column bore a distinctive character or sign and contained 30 words numbered in order. (This is followed by a list of the titles of the 54 columns and their signs.[11]) In order to designate a word, it was enough to indicate its number in a column and the sign of its column. This project shows a greater similarity to that of the anonymous Spaniard, the concepts being distributed into natural classes or logical categories.

It seems Kircher was not fully satisfied with either of these projects, for around 1670 he wrote to Leibniz that he was preparing a new work, to be entitled *The Tower of Babel*.[12]

2. On the whole, the various plans for a universal language with which Leibniz was acquainted at this time were fairly crude and scarcely merited the title of a language.[13] They were rather, as we have seen, convention-based systems of writing, analogous to telegraphic codes or diplomatic ciphers, in which the correspondence between words and numbers was wholly arbitrary and artificial. Thus Leibniz clearly indicated the inadequacy of these systems, whose primary failing was the lack of any logical or philosophical basis and whose interest was merely practical. The ambiguity of the terms, which had several senses in each language; the lack of exact synonyms, so that the words of different languages never corresponded precisely with each other; the diversity of syntaxes, so that a sentence translated word for word became barbarous or unintelligible; and finally, the nuisance of constantly having to check a dictionary, the memory being

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[8] This second dictionary consisted of 32 pages. The first 23 contained the most common nouns and verbs; the 24th, the names of countries; the 25th, the names of cities; the 26th, the names of times; the 27th, the proper names of persons; the 28th, adverbs; the 29th, prepositions; the 30th, pronouns; and finally, the 31st and 32nd, the different forms of the verbs *sum* and *habeo*.

[9] The idea for this multilingual dictionary had been suggested to Kircher by Emperor Ferdinand III on behalf of the peoples of different languages who made up the Empire and above all the domains of the crown of Austria. See Diels, "Ueber Leibniz und das Problem der Universalsprache," *Sitzungsberichte der konigl.-preuss. Akademie der Wissenschaften zu Berlin*, session of 29 June 1899 (Leibniz's birthday). Diels mentions a recent effort in the same genre: Ferdinand Hilbe's *Neue Weltsprache auf Grund des Zahlsystems* (1898).

[10] "*The Reduction of Languages to One....* Under the authority of His Supreme Highness Prince August, Duke of Brunswick and Lüneburg, the author Athanasius Kircher employs and makes public a new invention for the reduction of all languages to one, Rome, 17 October 1660" (LH V 1, 2).

[11] These signs are those of the 54 categories of Kircher's *Ars magna sciendi* (see Note II).

[12] See Leibniz to Oldenburg, 12/22 July 1670 (*Phil*., VII, 5; *Brief*., I, 40).

[13] We shall speak later of those he became aware of after writing *On the Art of Combinations*.

unable to retain the numbers referring to all the words of a language—these were the principal shortcomings Leibniz rightly criticized in these ingenious, but in reality unworkable, projects.

The universal writing he envisioned would, on the contrary, be extremely simple to learn and easy to retain because it would rest on a logical foundation, namely, the complete analysis of concepts and their reduction to simple terms.[14] Each simple term would be represented by a sign that would be as natural and fitting as possible.[15] In this way, one would construct a sort of ideographic alphabet, composed of as many symbols as there are elementary concepts or categories. Thereafter, each complex or derivative concept would be represented by the combination of signs that expressed its simple elements. As the simple concepts would be of a fairly small number, it would be enough to know the logical alphabet by heart in order to be able to read and understand at first sight a text written in this system without a dictionary.[16]

Thus, from the age of twenty, Leibniz had clearly conceived the plan of a *universal* and *genuinely philosophical* language that would surpass all the projects with which he was acquainted, in that it would be not only a stenography or cryptography, but a logical pasigraphy and ideography.[17]

3.   In the following years, Leibniz refined and developed his plan by comparing it with other contemporary projects that were somewhat more complete. This genre of invention appears to have been very much in vogue in the period. The plan of establishing a universal language that would replace all national languages, both in commerce between different nations and especially in the relations between the learned of Europe, clearly proceeds from the intellectual movement of the Renaissance, which in renewing philosophy and the sciences had revealed the fundamental unity of the human mind and had given birth to the idea of the international unity of all thinkers, so well captured in the expression "republic of letters." Furthermore, by freeing thought from the authority of the ancients and especially from the yoke of Aristotle, whose logic had reigned throughout the Middle Ages and still reigned in the Schools,[18] the Renaissance had provided the stimulus for scientific investigations and consequently had given birth to the desire for a new logic, better suited to the needs of the new sciences.[19] Reason became aware of its

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[14] "I had considered this matter prior to Mr. Wilkins's book, when I was a young man of nineteen, in my little book *On the Art of Combinations*, and my opinion was that genuinely real and philosophical characters must correspond to the analysis of thoughts." Leibniz to Burnett, 24 August 1697 (*Phil*., III, 216).

[15] Like the hieroglyphic signs of Kircher (see Note II).

[16] "If these [signs] are correctly and ingeniously constructed, this universal writing will be just as convenient as the vernacular. It will be capable of being read without any lexicon, and at the same time, it will give a fundamental knowledge of all things. All such writing should resemble geometrical figures or pictures, like those used once by the Egyptians and today by the Chinese; however, their pictures are not reducible to a fixed alphabet or letters, with the result that an incredible effort of memory is necessary, which is contrary to our plan." *On the Art of Combinations*, §90 (*Phil*., IV, 73; *Math*., V, 50).

[17] "Here, then, is Application XI of complexions, the construction of a universal polygraphy." *On the Art of Combinations*, §90 (ibid.).

[18] We may recall what epic and even tragic struggles Ramus had to maintain against the Peripatetics and what it cost him to have wanted to reform the Aristotelian logic.

[19] There is no need to remark on the revolutionary intention advertised in the title of Bacon's *Novum Organum* (as opposed to Aristotle's *Organon*), to which Leibniz often makes allusion (*Phil*., VII, 187,

force and independence and strained to liberate itself from all the shackles of tradition and routine; men began to recognize that antiquity could be surpassed in its knowledge of the universe and to glimpse the possibility of an indefinite progress.[20] The human mind finally became aware of its own unity and the unity of science. This whole great movement of ideas—this renewal of the sciences and the reform of logic that was both its condition and its consequence—must naturally have suggested the creation of a philosophical and scientific language more logical than ordinary languages, one that would be shared by all thinkers in every country.

4. We know that Descartes, having been informed by Mersenne of a plan for a universal language, gave his opinion on the matter in a famous letter. While criticizing the plan that had been submitted to him, he declared himself favorable in principle to the invention of a universal language and judged it possible. He even proposed adopting a logical principle for the creation of the vocabulary that closely resembles that of Leibniz: it would be necessary to set up a list of simple concepts, arrange them in order, and assign signs to them. Such a language would be at the same time a sort of logical instrument; however, its establishment "depends on the true philosophy," and that is one of the reasons Descartes believed it to be unrealizable in practice.[21]

It is unlikely that Leibniz knew of Descartes's letter when he wrote *On the Art of Combinations*, but he certainly was aware of it later (although we cannot ascertain precisely when), for among his manuscripts there is a copy (in a secretary's hand) of the part of the letter in which Descartes points to the logical foundation on which the universal language would have to be erected. Leibniz added a personal remark to this copy in which he maintained that if the establishment of this language depends on the true philosophy, it does not depend on its completion or perfection; in other words, it rests on the first principles of the sciences but does not presuppose their completion.[22] On the contrary, it will be developed and perfected along with the sciences, whose instrument it will be. With this, Leibniz answered in advance the main objection that might have been made at any time to philosophical languages based on the analysis of concepts. In any case, despite the similarity of Leibniz's project to that outlined by Descartes, it does not appear to have been derived from it. It seems rather that the two philosophers may have been in agreement, and such an accord is all the more remarkable.

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202). He also borrows from Bacon his title *On the Renewal and Advancement of the Sciences* (*Phil*., VII, 49, 64). Cf. *Foundations of the General Science* (LH IV 7A Bl. 24) and LH IV 8 Bl. 1, 3. For Leibniz's later (May 1681) judgment of Bacon, see *Phil*., VII, 67. The admiration he professes is not without reservation: he blames Bacon for having been too much of an empiricist and not enough of a mathematician.

[20] It is in this way that Joseph Glanvill (1636-1680), a member of the Royal Society of London, celebrated the progress of science in his *Plus Ultra, or the Progress and Advancement of Knowledge Since the Days of Aristotle* (London, 1668), which Oldenburg sent to Leibniz at his request. See Leibniz to Oldenburg, 8 December 1670 and 24 April 1671 (*Phil*., VII, 5; *Math*., I, 16, 18; *Brief*., I, 49, 55); cf. Leibniz to Thomasius, 20/30 April 1669 (*Phil*., I, 15).

[21] Descartes to Mersenne, 20 November 1629 (ed. Clerselier [1657], I, 111; ed. Adam-Tannery [1897], I, 97; cf. 112).

[22] LH IV 5, 6 Bl. 7-8. See, however, Leibniz to Burnett, 24 August 1697 (quoted in Chap. 4, §17, n. 134).

5. The inspiration that led Leibniz to refine and develop the system sketched in *On the Art of Combinations* came from another source. Projects for a universal language seem to have especially flourished at this time in England, in the circle of learned men who founded the Royal Society of London. One of them, John Wilkins,[23] had already published a work entitled *Mercury*, which appears to have been no more than a handbook for secret correspondence.[24] But this work then suggested to George Dalgarno a better and more philosophical system.[25] In theory, this system consisted of distributing every concept into one of seventeen basic classes or categories, each of which was designated by a letter that served as an initial for the corresponding words. Each class was then divided into subclasses designated by the same initial letter and distinguished from each other by the addition of a second letter. Finally, in each subclass there were gathered a number of words characterized by the same letters and distinguished by variations in a final letter.[26] This was, in short, a logical classification of concepts expressed by words that were formed systematically, in an arbitrary order, and which played the role of conventional indices or labels.[27]

It is evident that Dalgarno's plan constituted not only a system of correspondence and translation but a complete and universal language and system of writing. Wilkins in turn responded to this system and improved on it in a new work.[28] In place of the seventeen first-order classes, he counted 40, but instead of designating them by letters, he represented them by conventional symbols and expressed the subdivisions (differences and divisions) by marks added to the left and right of the symbol for the class.[29] Leibniz preferred a language that could be written with ordinary letters. He thus found Wilkins's signs useless and tedious.[30]

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[23] John Wilkins (1614-1672), Bishop of Chester, was, with Oldenburg, the first secretary of the Royal Society of London.

[24] *Mercury, or the Secret and Swift Messenger, Shewing how a Man May with Privacy and Spead Communicate his Thoughts to a Friend at a Distance* (London, 1641).

[25] *Ars Signorum, vulgo Character universalis et lingua philosophica* (London, 1661). For the rest of the title and details concerning this book, see Note III.

[26] Cf. *Lexicon Grammatico-Philosophicum* (LH IV 7D, 1 Bl. 1, and Note III).

[27] Dalgarno had already invented a system (completely independent of the preceding one) for translating numbers into words. To each digit he assigned a corresponding vowel (or diphthong) or consonant; he then translated each number by a series of letters corresponding to the series of its digits (in the proper order), preceded by the letter V (characteristic of the names of numbers). We mention this system because it seems to have suggested to Leibniz his project of founding a universal language on the translation of numbers into words. (See §7 and Note III.)

[28] *An Essay Towards a Real Character and a Philosophical Language, with an Alphabetical Dictionary* (London, 1668). Leibniz reports it under the inaccurate title (reminiscent of the work of Kircher) *Wilkens's Polygraphy* in a letter to Thomasius of 26 September 1668 (*Phil.*, I, 9). See the analysis of this work in Note IV.

[29] Gerhardt, *Phil.*, VII, 7-9 (Introduction); cf. Note IV.

[30] "I would prefer a language to a character; a language could be written with common characters.... And so Wilkins could have omitted his characters, which greatly deter one" (LH IV 7B, 3 Bl. 49; cf. LH IV 7B, 3 Bl. 24 recto). Gerhardt is therefore mistaken in claiming that it is precisely for this reason that Leibniz preferred Wilkins's system to that of Dalgarno (*Phil.*, VII, 8, note). In fact, Leibniz cites Dalgarno just as frequently as Wilkins and often at the same time. See Leibniz to Burnett, 24 August 1697 (*Phil.*, III, 216) and Leibniz to Rodeken, 1708 (*Phil.*, VII, 32). Nevertheless, it is still Wilkins's system that he considered to be the best of those existing and the one most useful to propagate (Report to Councilor von Ilgen, 15 July 1709; *Phil.*, VII, 33, 35, 36). Leibniz knew of yet another project for a universal language, which he desribed in these terms: "Fr. Labbé, a very wise French Jesuit, known for many other works,

6. Leibniz learned of Wilkins's new book at the beginning of 1671,[31] and he appears to have found it much to his liking, for he repeatedly expressed his desire to see it translated into Latin.[32] Nevertheless, while approving of the systems of Dalgarno and Wilkins, which had in his eyes the advantage of being at the same time spoken and written languages,[33] he indicates clearly what he thinks they lack in a note inscribed in his copy of *Ars Signorum*.[34] He criticizes these systems for focusing on practical uses rather than scientific utility, that is, for chiefly being artificial languages intended for international communication and not philosophical languages that would express the logical relations of concepts. He favors, and opposes to them, the true "real characteristic," which would express the composition of concepts by the combination of signs representing their simple elements, such that the correspondence between composite ideas and their symbols would be natural and no longer conventional.

He further defines his project and intentions in a letter to Oldenburg, composed during his sojourn in Paris (1673-1676).[35] He elevates his "rational writing" well above previous attempts, saying that the least of its advantages would be to underwrite commerce between nations; thus he subordinates its practical utility to its logical utility as the "instrument of reason."[36] He next explains what he understands by a *real* characteristic,[37] offering as examples Egyptian and Chinese hieroglyphics[38] and chemical signs.[39] This shows that the real characteristic is for him an ideography, that is, a system

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constructed a language, using Latin as its basis, which is easier and has fewer constraints than our Latin but which is more regular than the *lingua franca*" (*New Essays*, III. ii.1; Labbé lived from 1607 to 1667. *Lingua franca* was the Italian dialect employed in Mediterranean ports). Leibniz speaks in the same passage of an Armenian Dominican who spoke without any grammatical inflections and yet could make himself understood. This Dominican is also mentioned in *Grammatical Thoughts* (LH IV 7B, 3 Bl. 25).

[31] Leibniz to Oldenburg, 29 April 1671 (*Phil.*, VII, 6; *Brief.*, I, 58).

[32] Ibid., and Leibniz to Oldenburg, 16/26 April 1673 (*Phil.*, VII, 9; *Brief.*, I, 92). Cf. *Phil.*, VII, 19.

[33] These are the only ones he mentions in connection with an artificial language in the *New Essays*, III.ii.1. Cf. Leibniz to Burnett, 24 August 1697 (*Phil.*, III, 216), and Leibniz to Rodeken, 1708 (*Phil.*, VII, 32).

[34] See Note III.

[35] Trendelenburg, III, 32-37; *Phil.*, VII, 11-15; *Brief.*, I, 100-104.

[36] "But I say that a rational writing will become the most powerful instrument of reason, and it ought to be judged that its least application is commerce among men separated by language" (*Phil.*, VII, 12). Cf. Leibniz to Galloys, 1677 (*Phil.*, VII, 21; *Math.*, I, 180).

[37] "I believe that the hieroglyphics of the Egyptians and Chinese and, for us, the signs of the chemists, are examples of real characters, but such as have been designated by authors until now, not such as are ours" (ibid.). Cf. *Phil.*, VII, 25, 204.

[38] Leibniz appears to believe that Egyptian hieroglyphics represented objects directly, which is only partly true, for they also indicated syllables and letters. With regard to Chinese characters, a Jesuit missionary in China later told him, "The Chinese language and characters are like two different languages, one of which speaks to the ears, the other to the eyes" (Bouvet to Leibniz, 4 November 1701; Dutens, IV.1, 161). At the beginning of his letter to Oldenburg (*Phil.*, VII, 11-15), Leibniz describes the authors of universal languages as "those who have wanted to follow the example of the Chinese in some universal language that anyone would understand in his own language" (*Phil.*, VII, 11). He again makes reference to Chinese characters in a manuscript note of 26 March 1676 (quoted Chap. 4, §2, n. 11), which proves that his interest in Chinese civilization did not depend on his contacts with missionaries in China. Elsewhere he relates Wilkins's system to Chinese characters (Leibniz to Bourguet, 1709; *Phil.*, III, 544).

[39] It goes without saying that what are in question here are cabalistic or alchemical signs that designate a certain body (for example, by the sign of the corresponding planet) without expressing its composition. The notation of modern chemists, on the other hand, corresponds perfectly to Leibniz's intention and may be considered an application of his characteristic, for it represents the composition of bodies by the

of signs that directly represent things (or rather ideas) and not words, in such a way that each nation can read them and translate them into its own language. It would be at once a system of writing and a language, each sign being given a unique conventional name,[40] yet this writing could also be read in different languages, just as Chinese can.[41]

7. Such were the ideas Leibniz had about the universal language during his stay in Paris and which he announced to Oldenburg and his colleagues at the Royal Society of London. In May 1676, he once again identified the universal language with the characteristic and dreamed of a language that would also be a calculus—a sort of algebra of thought.[42] For this, he had only to develop the principle laid down in *On the Art of Combinations*. Since all concepts are combinations of simple ideas, and the composition of concepts analogous to the composition of numbers from prime factors, it was natural to take the prime factors as symbols for the simple ideas and numerical multiplication as a symbol for the combination of concepts (that is, for the adjunction of their contents). This analogy was familiar to Leibniz and he developed it freely. The prime numbers are, so to speak, *categories* in relation to their multiples: the multiples of 2 are the binaries, the multiples of 3 the ternaries, the multiples of 6 the senaries, and so on. Since every multiple of 6 is also a multiple of 2 and 3, every senary is a binary-ternary, just as 6 is the product of 2 and 3.[43] In order to express that man is a rational animal, one would represent (for example) *animal* by 2, *rational* by 3, and *man* by 6, giving the numerical equality 6 = 2 x 3, which corresponds to the logical equality *man = animal* x *rational*.

This is the principle of the first logical calculus Leibniz conceived.[44] He stated it in February 1678 in a fragment entitled *A General Language*,[45] and he took it as the basis of a plan for a universal language.[46]

In order to transform this characteristic into a spoken and written language, it would suffice to translate the numbers into words by a method similar to that of Dalgarno. The method of translation envisaged by Leibniz is as follows: The first nine consonants (*b, c, d, f, g, h, l, m, n*) would represent the nine significant digits, and the five vowels (*a, e, i, o, u*) would represent powers of 10 in ascending order (1, 10, 100, 1000, 10000). One could if necessary extend the series by means of diphthongs (again following the example of Dalgarno). In order to state or write a number, it would be enough to take the

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combination of signs for the elements and allows, if not for reasoning about them, at least for representing and elucidating their reactions and transformations by means of different combinations of these signs. Elsewhere Leibniz even includes among the types of signs musical notes and astronomical signs (the signs of the zodiac and those of the planets, including the sun and the moon). It should be noted that Leibniz sometimes employs planetary signs in place of letters in his algebraic calculations.

[40] *Phil.*, VII, 12-13, 22.

[41] There is a rather crude essay on the characteristic in a letter to an unknown patron (Boineburg?), in which Leibniz makes the highest classes *riches*, *honors*, and *pleasures*, represented respectively by a square, a circle, and a triangle (LH IV 5, 6 Bl. 11).

[42] "The characteristic art or rational language, which wonderfully provides a shortcut for the operations of the mind and alone can offer in physics what algebra offers in mathematics." *The Method of Physics. Characteristic* (LH IV 5, 6 Bl. 9-10; Foucher de Careil, VII, 103).

[43] *On Universal Synthesis and Analysis* (*Phil.*, VII, 292). Cf. Chap. 6, §9.

[44] See Chap. 8, §§1-7.

[45] LH IV 7B, 3 Bl. 3 (see §17, note 108).

[46] Related to this plan is the idea of representing all genitives by, for example, multiples of 3 or some other prime number. See *A Rational Language* (*Phil.*, VII, 29n.).

consonants that correspond to its successive digits, following each by the vowel which indicates its power of 10. Thus the number 81374 would be written and pronounced *mubodilefa*.

The advantage of this notation over Dalgarno's lay in the fact that each syllable signifies (through its vowel) its power of ten, so that its value is independent of its position in the word, which can be easily altered. Thus the same number would be expressed just as well by the word *bodifalemu*, which literally signifies $1000 + 300 + 4 + 70 + 80000 = 81374$.

Leibniz found great satisfaction in the possibility of rearranging all the syllables of a word; in his view this would render the artificial language more agreeable and harmonious and would offer marvelous opportunities for poetry and music. He even shows how one could translate it into music, using intervals.[47] He believes one could compose "very beautiful" poems and chants in the language by an infallible and quasi-demonstrative method, with everything determined.[48] We see that from here on, Leibniz borrows his ideal of logic and even his aesthetic from mathematics.

8. He soon perceived, however, that the problem was more difficult and more complex than he initially believed. As an alternative to creating *a priori* and out of nothing a purely conventional language, he adopted a less arbitrary and more measured *a posteriori* method. He took as a point of departure living languages and extracted from them by logical analysis, on the one hand, simple ideas to express and combine, and on the other, a *rational grammar*, by simplifying, regularizing, and blending together the grammars of different languages. He set to work in April 1678, intending to reduce speech to the terms strictly necessary for the expression of thought, in order to discover the simple and primitive elements of thought itself.[49] He outlined his plan in a fragment dated 11 September 1678[50]: his aim was still the analysis of thought, but this analysis could be facilitated and even replaced by the analysis of characters, the sensible signs of thought, of which the principal one is language. The analysis of language consists of resolving all the elements of speech into simpler terms by means of definitions; when these terms can be decomposed no further, one explains them, indicating their sense by means of equivalent terms. These irreducible terms are, in general, all the elements of speech that cannot be defined by decomposition: namely, words (with the exception of compound words), colloquial expressions, and those sentences and formulas, like proverbs, whose sense is established by use and cannot be explained by grammatical analysis. Next, one studies the syntax, that is, the different ways of assembling and combining the elements of speech, and consequently inflections (declensions and conjugations) and particles. One must also submit inflections and particles to analysis by reducing them to the simplest elements possible. It is necessary to define and distinguish with care their different senses, as there are homonyms among the inflections and particles, so that each inflection and each particle of the universal language has a unique and determinate sense. One must likewise reduce anomalies (grammatical and syntactical irregularities) to standard forms,

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[47] *A Universal Language* (LH IV 7B, 3 Bl. 4). An allusion to this project appears in *New Essays*, III.i.1.

[48] Ibid. Here again, he is inspired by Kircher, whose *Musurgia*, the art of composing melodies without knowing music, he cites.

[49] *On the Rational Grammar* (LH IV 7B, 3 Bl. 7).

[50] *The Analysis of Languages* (LH IV 7C Bl. 9-10).

thereby constructing a rational grammar that is absolutely regular and free of exceptions.[51]

9. Yet, as the establishment of a rational grammar must necessarily precede that of the universal language to which it is destined to be applied,[52] Leibniz needed an auxiliary idiom that would provisionally play the role of a universal language and serve as an intermediary between living languages and the future rational language.

Latin was the obvious choice for this role, since it was the common language of the learned and consequently the idiom most suited to the sciences and philosophy.[53] Leibniz planned first to construct a universal Latin grammar, which would unite all the resources and advantages of other languages, notably genders and cases, moods and tenses, so as to provide every distinction and nuance that any language can express.[54] But at the same time, this philosophical grammar would be purged of every irregularity and exception that taints actual grammars, with the result that it would be both simpler and richer than any other. In this way, each of these grammars, including that of Latin, would be only a

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[51] The studies of comparative philology to which Leibniz applied himself with a view toward the creation of a universal language suggested to him several practical or pedagogical ideas that even today retain interest and utility. In a letter to Job Ludolf (1688?), he first expresses the wish of seeing the alphabets of all human languages transcribed into Latin letters, since the difference of alphabets is the first and greatest obstacle to the learning of certain languages (Cf. LH IV 7B, 3 Bl. 49). He adds, "Thereafter, I wish that a small dictionary would be produced by men skilled in languages, in which the roots and principal terms of most human languages would be contained, and that a small compendium of their grammars would be added, which would suffice for conversations, writing, and the reading of easier books, and later, through the use and study of these for any longer book that should appear" (Dutens, VI.1, 88-89). Elsewhere he gives the plan for one of the lexicons that he wishes for, namely an "index of the words expressing the more common things," and he successively enumerates the most common words that designate first, numbers; second, age and kinship; third, parts of the body; fourth, the things necessary for life; fifth, natural beings; sixth, actions. *Leibniz's Desires Concerning the Languages of Men, Sent to the Honorable Podesta, Translator of Caesar and Professor of the Turkish Language* (Dutens, VI.2, 228). Likewise, when Leibniz contemplated the renewal of the German language, on which he wrote a 1696 dissertation addressed to the Duke of Wolfenbüttel, he proposed instituting a society (similar to the French Academy and founded with an analogous aim) that would be charged with drafting three dictionaries: "a lexicon of the more common words, a cornucopia of techniques, and a glossary of etymologies" (Leibniz to Johann Bernoulli, 28 December 1696; *Math.*, III, 350). Cf. *Some Modest Thoughts Concerning the Practice and Improvement of the German Language* (Guhrauer, I, 440; II, 136). In a letter to Gabriel Wagner (1696), he recommends learning languages by first using them and then by studying the rules of grammar (*Phil.*, VII, 523, 526). It is by this *autodidactic* method, moreover, that he himself learned classical languages (*Phil.*, VII, 52; cf. *The Life of Leibniz Briefly Sketched by Himself*: Klopp, I, xxxiii; Guhrauer, II, Notes, 53). Finally, he occupied himself with collecting comparative samples of all languages (notably Slavic and Asiatic languages) by making translations of the Lord's Prayer into these languages. (See Leibniz to the Landgrave Ernst Hesse-Rheinfels, July 1692, in Rommel, II, 427; *The Lord's Prayer and Other Prayers, Expressed in Various Foreign Languages*, with the extracts of letters from Witsen (1697-9), in Dutens, VI.2, 203ff.; *On the Language of the Tartars* (1698), in Guhrauer, II, 478; Leibniz to Sparvenfeld, 29 January 1697 and various memoranda to Peter the Great, in Foucher de Careil, VII, 419ff., 398ff., 519ff.; and finally, the fragments published in Bodemann, 257, 261).

[52] Since the establishment of the vocabulary or nomenclature presupposes the previously established grammar.

[53] *The Analysis of Languages*, September 1678 (LH IV 7C Bl. 9 verso); *A Rational Language* (*Phil.*, VII, 28-30); Trendelenburg, III, 37-40); *A Specimen of the Philosophical Language*, January 1680 (LH IV 6, 10b).

[54] This, in short, is the plan for a comparative grammar that he mentions in the *New Essays* (III.xi.9).

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part of the philosophical grammar, at least insofar as they are regular. As we have said, this grammar would be applied provisionally to Latin and would constitute an absolutely regular Latin grammar.[55] One would similarly first apply to Latin the method of analysis and reduction described above. For example, intransitive verbs would be replaced by paraphrases. In place of "the Lord needs these things," one would say, "the Lord wants to have these things, since without them he cannot carry out something that is necessary," which gives the definition of the verb "to need." In general, one would translate or paraphrase every complex locution, every indirect expression, and every idiom in order to reduce them to simple and direct terms (for example, active verbs).[56] In doing so, one would even simplify the vocabulary by suppressing all words having a complicated or opaque meaning.

10. This is still only the first step in the simplification of grammar. Leibniz regarded the plurality of declensions and conjugations as superfluous, even when reduced to regular types. Therefore, the rational language would contain only one declension and one conjugation, both completely uniform.[57] Likewise, the distinction of gender is useless and can be dropped without inconvenience.[58] These suppressions leave the rational language much easier to comprehend than actual languages, whose principal difficulty consists in the diversity of genders, declensions, and conjugations.[59] Conjugation itself can be simplified considerably, for distinctions of person and number are unnecessary: they are adequately shown by the subject.[60] These sorts of pleonasms seem to be designed to remedy the inattention of listeners by repeating the same meaning twice over.[61] As for nouns, Leibniz goes so far as to deprive them of the distinction of number, no doubt believing that it can be shown by an article or adjective (e.g., *some*, *several*, *all*).[62] With greater reason, he strips adjectives of inflection, since they only serve to repeat the inflections of the corresponding noun.[63]

11. The only inflections that remain are case for nouns and tense and mood for verbs. But in general, inflections and particles play the same role in grammar and can be substituted for one another, since both express the coordination of words and sentences, the relations of concepts and propositions.[64] Synthetic languages tend to employ inflections, while analytic languages use particles. Initially, Leibniz seems to have hesitated between these

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[55] *Plan for a New Encyclopedia*, June 1679 (LH IV 5, 7 Bl. 3 verso).

[56] *A Rational Language* (*Phil.,* VII, 28).

[57] "A plurality of declensions and conjugations is useless" (LH IV 7B, 3 Bl. 49). "Different declensions are useless" (LH IV 7B, 3 Bl. 8). *Grammatical Thoughts*: "Distinctions of declension and conjugation play no role in a philosophical grammar" (LH IV 7B, 3 Bl. 25).

[58] "The distinction of gender does not apply to the rational grammar" (LH IV 7B, 3 Bl. 25).

[59] "It is manifestly clear that the most difficult part of grammar to learn is the variety of genders, declensions, and conjugations" (ibid.).

[60] "Number is useless in verbs, for it is well enough understood from the pronominal adjective.... The person of the verb can also be fixed: It suffices that I, you, he, etc., change" (LH IV 7B, 3 Bl. 49).

[61] LH IV 7B, 3 Bl. 40 verso. A striking example of these pleonasms is furnished by Semitic languages, in which the verb varies according to the gender of the subject (LH IV 7B, 3 Bl. 49).

[62] "It seem that the *plural* is useless in a rational language" (LH IV 7B, 3 Bl. 8).

[63] "Inflections have no use in adjectives, for it is enough that they are contained in the adjacent substantive" (LH IV 7B, 3 Bl. 49).

[64] See *New Essays*, III.vii.2.

two systems: one either translates all the inflections of Latin by analogous inflections of the rational language or, carrying the analysis of grammatical relations to its conclusion, reduces all inflections to particles (for example, cases would be replaced by the nominative preceded by different prepositions). Later, however, he inclined toward the latter course, which is more in keeping with the analytic ideal of the rational language, and he preferred an analytic language like French to a synthetic language like Latin.[65]

Leibniz therefore attempts to do away with inflections wherever possible. He first notes that prepositions govern cases, just as conjunctions govern moods. Again, there are two options: either the cases and moods allow us to dispense with prepositions and conjunctions, or prepositions and conjunctions render cases and moods useless. Leibniz prefers the second alternative, for the reason that there are many more prepositions than cases and many more conjunctions than moods; consequently, one cannot render by inflections the variety of relations that can be expressed by particles.[66] For example, what good is the distinction between the indicative and subjunctive governed by *quod* and *ut* respectively, given that these two conjunctions differ like the intellect and the will, the one signifying what *is*, the other what one wishes *may be*?[67] Thus Leibniz appears to want to suppress any distinction of mood, as well as any distinction of case.[68] Nevertheless, he does preserve a single oblique case elsewhere. It seems that this would have to be the accusative, the only case that cannot be replaced by a preposition. But this case is itself reduced to the genitive when the verb is converted into a verbal noun by grammatical analysis: "I praise Titus becomes I am a praiser of Titus."[69]

In verbs, there remains only the distinction of tense, which is essential to them. Nevertheless, Leibniz was not afraid to criticize the traditional definition of the verb, which goes back to Aristotle—"The verb is a word that signifies time"—by showing that nouns can also signify time: for example, participles, which are nouns (or adjectives) derived from verbs.[70] The distinction of tense can also be applied to nouns,[71] adjectives, and even adverbs.[72] As a consequence, Leibniz rejected the Aristotelian distinction between nouns and verbs and very sensibly replaces it with the following: A noun expresses an idea; a verb expresses a proposition (an affirmation or negation).[73] Into the class of nouns are drawn not only nouns and adjectives but also pronouns, particles, and adverbs.

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[65] *A Rational Language* (*Phil.*, VII, 29). Cf. *Plan for a New Encyclopedia*, June 1679: "The case of nouns can always be eliminated by substituting in their place certain particles with the nominative, as is obvious from languages in which there is no inflection of nouns except through particles" (LH IV 5, 7 Bl. 3 verso). An erasure proves that Leibniz was thinking of the example of French.

[66] LH IV 7B, 3 Bl. 40 verso.

[67] LH IV 7B, 3 Bl. 14.

[68] "In the rational grammar, oblique cases are unnecessary, as are any other inflections" (LH IV 7B, 3 Bl. 26 verso).

[69] LH IV 7B, 3 Bl. 24 verso.

[70] LH IV 7B, 3 Bl. 8; 25 verso.

[71] "The tense of nouns: for just as we say *amatio* [loving], the action of one who loves, so there is *amavitio* [was loving] or *amaturitio* [will be loving], the action of one who has loved or will love" (LH IV 7B, 3 Bl. 41 verso).

[72] For example, *rem ridiculuram vel ridiculam futuram*, "a will-be-ridiculous or a future ridiculous thing," whence the adverb *ridiculure*, "will be ridiculously," in regard to which Leibniz recalls an amusing anecdote (LH IV 7B, 3 Bl. 40 verso).

[73] LH IV 7B, 3 Bl. 8; 25 verso.

12. Leibniz attempted to reduce still further the parts of speech by seeking to replace some with others. First, adjectives are only distinguished from nouns because their gender can change, but if one does away with this difference, they are identical.[74] Nor do degrees of comparison define adjectives, for they are equally applicable to nouns, pronouns,[75] and even verbs.[76] The only possible logical difference between adjectives and nouns is that the latter imply the idea of *substance* or being; therefore, any noun is equivalent to an adjective accompanied by the word "being" or "thing."[77] On the other hand, all verbs can be reduced to the single substantive verb "to be" and adjectives: "Peter writes, that is: is writing."[78] Likewise, adverbs can be reduced to adjectives, since in a way they are to verbs what adjectives are to substantives, and serve to qualify the verb.[79] Instead of saying, "I drink deeply," one may say "I am a great drinker," in which the verb is replaced by a substantive and the adverb by an adjective.[80]

In the end, all speech can be reduced to the single substantive noun "being" or "thing," the substantive verb "is," adjectival nouns (expressing qualities), and particles, which serve to join all the preceding words together and to indicate their relations.[81] One could therefore form every noun and verb derivatively from roots that indicate simple ideas, either substantival or verbal. Hebrew employs verbs as roots; Leibniz preferred nouns, undoubtedly because they naturally give rise to verbs.[82] In order to establish the vocabulary it would suffice, on the one hand, to form a lexicon of the roots, and on the other, to draw up a list of endings that would serve to form the derivatives, each of which would have a unique and well-defined sense.[83]

13. This is the method for forming words in the strictest sense (nouns and verbs); it remains to consider the particles, to determine their number and their sense. This is not the least critical phase in the establishment of a language, for Leibniz regarded particles as playing an extremely important role in language: they constitute the form of a language,[84] and determine its syntax, operation, and physiognomy. They are the frames or

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[74] "In a rational language, the difference between adjectives and nouns is of no great importance" (LH IV 7B, 3 Bl. 41 recto; cf. LH IV 7B, 3 Bl. 12).

[75] LH IV 7B, 3 Bl. 8: "*ipsissimus* [the very one]"; LH IV 7B, 3 Bl. 42: "*ego, egomet; tu, tute; ille, illemet seu ille ipse, ipsemet* [I, I myself; you, you yourself; he, he himself or he alone, he himself alone]."

[76] LH IV 7B, 3 Bl. 8: "*summe currere, currissimare* [to hurry most]."

[77] "A man is the same as a human being" (LH IV 7B, 3 Bl. 41 recto). "Every adjective has a similar expressed or suppressed substantive" (LH IV 7B, 3 Bl. 26 recto).

[78] *On the Rational Grammar* (LH IV 7B, 3 Bl. 7). *Plan for a New Encyclopedia*, June 1679 (LH IV 5, 7 Bl. 3 verso).

[79] "Verbs are to adverbs as substantive nouns are to adjectives" (LH IV 6, 12f Bl. 20). "Adverbs are like the adjectives of verbs" (LH IV 7B, 3 Bl. 7); cf. LH IV 7B, 3 Bl. 10; *Plan for a New Encyclopedia* (LH IV 5, 7 Bl. 3 verso); LH IV 7B, 3 Bl. 41 recto.

[80] LH IV 7B, 3 Bl. 10.

[81] LH IV 7B, 3 Bl. 41 recto.

[82] LH IV 7, 13, 3 Bl. 42: from the root *vita* [life] Leibniz deduces *vivus* [having lived], *vivere* [to live], *vivens* [living], etc. Cf. LH IV 7B, 3 Bl. 25 verso: "For from the verb to be...with any noun a verb can immediately be produced: e.g. I am ill, I ail; I am healthy, I thrive; I am good, I excel."

[83] LH IV 7B, 3 Bl. 25 verso. For example, *bilis/amabilis* [able/lovable], *tivus/activus* [tive/active], *titudo/rectitudo* [titude/rectitude].

[84] LH IV 7B, 3 Bl. 40: "Words are terms or particles. Terms constitute the matter of speech, particles the form." Cf. *New Essays*, III.vii.3: "It is very true that the doctrine of particles is important, and I wish it had been dealt with in greater detail. For nothing would be better suited to making known the different

molds into which the variable matter of discourse, represented by words, comes to be cast. Thus Leibniz exercised an uncommon care in the analysis of particles and of their sense and function.[85] These particles include not only prepositions and conjunctions but also many words classified without reason among the adverbs, notably adverbs of time, place, and interrogation, which have nothing in common with genuine qualifiers, such as adverbs of manner.[86] Leibniz has an ingenious theory concerning prepositions.[87] According to him, all prepositions primitively signify some relation of place, and it is by metaphor that they subsequently come to designate relations of every sort. This principle or hypothesis provided him with a method for classifying and logically defining all prepositions in terms of whether they do or do not involve the idea of movement.

Again, Leibniz added to this *a priori* method for constructing particles an *a posteriori* method, by enumerating the various Latin particles, analyzing them, defining them, and classifying them.[88] It is likely that he did not see an essential difference between prepositions and conjunctions,[89] any more than between prepositions and adverbs of place and time, which differ only in their lack of an explicit antecedent.

14. An analysis of inflections obviously must be added to the analysis of particles, since these play the same syntactical role. Thus Leibniz attempted to analyze the various cases and replace them with paraphrases from which they would be excluded. He was chiefly concerned with analyzing the genitive, to which, as we have seen, he rigorously reduced all the other cases; it was for him the paradigm of obliquity, since it appeared to him to express the simplest relation.[90] This relation consists of uniting one substantive with another in order to determine it, that is, to make its sense precise and specific. The sword of Evander is the sword that Evander possesses; the reading of poets is the act by which one reads poets. But this inversion does not succeed everywhere: "Paris is the lover of Helen" means "Paris is a lover insofar as Helen is loved"; likewise, "This sword is the sword of Evander" means "This sword is an instrument insofar as Evander is an owner."[91] Leibniz discovered in this way that the genitive in fact expresses very different relations: relations of whole to part ("the man's hand"); of cause to effect ("the man's son"); of possesser to possessed ("the man's horse"); and of subject to predicate ("the man's title").[92] It is the same for the dative and the ablative. Thus in order to express the different cases and eliminate their obliquity, one must break the proposition up into two others related by a conjunction such as "insofar as."

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forms of the understanding." See the next sentence, in which Leibniz speaks of the "philosophical grammar."

[85] See notably LH IV 7B, 3 Bl. 34-37 (8 folio sides): "On the use and construction of prepositions; on the construction of conjunctions and the role they play in speech.*"

[86] LH IV 7B, 3 Bl. 26 recto: "For does, say, an adverb of interrogation have anything in common with the adverb 'strongly', that is, with strength?"

[87] LH IV 7B, 3 Bl. 27; 43; 59-64 (*Analysis of Particles*, 12 folio sides).

[88] LH IV 7B, 3 Bl. 50-58: 15 folio sides containing definitions of all the particles arranged in alphabetical order. Cf. LH IV 7B, 2 Bl. 45: "Particles of time, order, and place."

[89] "*Prepositions* join nouns, *conjunctions* join entire propositions" (LH IV 7B, 2 Bl. 12 verso). Cf. the analogy noted in LH IV 7B, 3 Bl. 40 verso (see above §11) and *New Essays*, III.vii.2.

[90] LH IV 7B, 3 Bl. 24 verso.

[91] LH IV 7B, 3 Bl. 26 recto.

[92] LH IV 7B, 2 Bl. 12 verso.

Using the same method, Leibniz also attempted to analyze judgments of comparison. Consider, for example, the proposition "Titus is wiser than Caius." It is analyzed as follows: "Insofar as Titus is wise and Caius is wise, Titus is superior and Caius inferior"; or better still, "Titus is wise and as such superior, insofar as Caius is wise and as such inferior."[93]

15. This grammatical analysis of inflections and particles had, as we have seen, a logical significance, especially since Leibniz thought that certain inferences (from the direct to the oblique), which Jungius had shown not to be reducible to syllogisms, could not be demonstrated in any other way.[94] This is why he always considered grammatical analysis (or characteristic) as an indispensable prelude to logical analysis (or characteristic).[95] Among oblique inferences, which depend on grammar rather than logic,[96] Leibniz cites the *inversion of relations*, which Jungius had catalogued in his *Tabula de Dianoea*,[97] and

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[93] LH IV 7B, 3 Bl. 5.

[94] *Plan for a New Encyclopedia*, June 1679 (LH IV 5, 7 Bl. 3 verso, Bl. 4 recto). Cf. LH IV 7C Bl. 69: "As Jungius recognized, consequences that cannot be proved by any syllogism or by any other logical method are to be referred to the grammatical characteristic." *Plan for the Renewal of Letters*: "But these arguments are demonstrated in part by means of syllogisms and in part by means of grammatical analyses, which naturally arise from an explication of the very terms, particles, connectives, and inflections" (Klopp, I, 50). Concerning Jungius (1587-1657), see *Catalogue of Logical Discoveries* (LH IV 7B, 4 Bl. 32) and *New Essays* IV.xvii.4. An unpublished manuscript (LH IV 7C Bl. 151) tells us that the note on Jungius inserted in the *Journal des Savants* of 22 August 1678 is by Leibniz. It reads: "*Harmonica et Phytoscopica scripta Posthuma Joachimi Jungii.* Hamburg, 1678. This Jungius was unquestionably one of the greatest mathematicians and philosophers of his time and one of the cleverest men that Germany has ever had. He was, however, little known there during his life and much less elsewhere, because he did not want anything published during his lifetime, not being able to satisfy himself concerning his own works." (As Vagetius remarked to him, Leibniz exaggerates, for the *Logica Hamburgensis* was published in 1638, during Jungius's life.) In *History and Praise of the Universal Characteristic Language*, Leibniz places Jungius on the same level as Aristotle and Descartes: "Joachim Jungius of Lübeck was a man known to few even in Germany itself, but of such profound judgment and such broad intellectual ability that I do not know whether a great restoration of the sciences could have been more rightly expected from any mortal, not excepting even Descartes himself, if he had been either acknowledged or assisted" (*Phil.*, VII, 186). Elsewhere Leibniz even places him above Descartes as a logician (see Chap. 4, §6). Cf. *Some Notes Concerning the Life and Doctrine of Descartes*, 1693 (*Phil.*, IV, 314); *Antibarbarus Physicus* (*Phil.*, VII, 343); Leibniz to Koch, 2 September 1708: "Joachim Jungius is worthy of being mentioned with the highest praise, for in my opinion he was a great man and surpassed all others in knowledge of the true logic, including even the author of the *Art of Thinking* [i.e., Antoine Arnauld, to whom Leibniz attributed the *Port Royal Logic* entitled the *Art of Thinking* (1662). See Note XII.]" (*Phil.*, VII, 478); Leibniz to Bierling, 7 July 1711 (*Phil.*, VII, 498); Leibniz to Gabriel Wagner, 1696 (*Phil.*, VII, 523); Leibniz to Conring, 3 January 1678 (*Phil.*, I, 188); Leibniz to Huet, 1679 (*Phil.*, III, 16); Leibniz to Fogel, 13/23 January 1671 (Dutens, V, 540); Leibniz to Christian Wolff, in *Acta Eruditorum*, 1713 (Dutens, III, 408); and *Some Thoughts Concerning the Method of Completing and Improving the Encyclopedia of Alsted* (Note XII).

[95] *The Analysis of Languages*, September 1678 (LH IV 7C Bl. 10 verso). Cf. *New Essays*, III.vii, end of §7: "I genuinely believe that languages are the best mirror of the human mind and that an exact analysis of the meanings of words would make the operations of the understanding better known than anything else" (cf. §13, note 84). In *Plan for a New Encyclopedia* (June 1679), grammar comes first, immediately before logic (LH IV 5 Bl. 7).

[96] "All oblique inferences are to be explained via the explanation of terms" (LH IV 7B, 2 Bl. 12 recto). Concerning the general demonstration of these inferences, see Chap. 6, §16.

[97] Copied by Leibniz (LH IV 7C Bl. 151). Jungius classified these inferences from the direct to the oblique as follows: (1) *Direct affirmative*: "A circle is a figure, therefore whoever draws a circle draws a figure." (2) *Inverse affirmative*: "Every reptile is an animal, therefore whoever created every animal created

of which he gives the following examples: "David is the father of Solomon, and therefore Solomon is the son of David"[98]; "Peter is similar to Paul, and therefore Paul is similar to Peter."[99] All of these non-syllogistic consequences, which can only be demonstrated in ordinary languages by the analysis of terms and the substitution of the definition for the defined, would become demonstrable in an immediate and intuitive way through the very composition of the words used to express the relations.[100] This is the ideal of the universal language: to express concepts by characters that render their composition and their relations manifest and transparent.[101]

16. This brings us to the establishment of the vocabulary of the universal language, to which the rules of the philosophical grammar must at last be applied. We have seen how Leibniz sought to simplify grammar and syntax as much as possible, in order to render them truly logical and hence universal. One would first translate the sentences of any language into a simplified and standardized Latin, and then from this Latin into the rational language. Undoubtedly the paraphrases that would have to be given for rather complex thoughts would entail the elimination of certain nuances and would render speech prolix and often flat, but Leibniz deliberately sacrificed the elegance and brevity of language for precision and conciseness of thought.[102]

Just as the analysis of particles and inflections by means of paraphrases uncovers the primitive logical relations, so the analysis of concepts by means of the definition of words reduces them to simple notions; just as the first is the indispensable basis for the grammar and syntax of the philosophical language, so the second serves as the logical

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every reptile." (3) *Negative*: "Some wealthy person is not happy, therefore some wealth is not happiness." (Note that the second "some" could be omitted.)

[98] Ibid. Cf. LH IV 7B, 3 Bl. 24, and *New Essays*, IV.xvii.4.

[99] LH IV 7B, 2 Bl. 12 recto.

[100] LH IV 7B, 3 Bl. 24: "The aim of our characteristic is to employ such terms that every consequence that can be established immediately from the words or characters themselves becomes known.... These consequences cannot be demonstrated from the Latin words unless they are reduced to other equivalent expressions; in the universal language it ought to be possible to demonstrate them by the analysis of words into their letters."

[101] This is also the ideal of the characteristic (see Chap. 4). Leibniz was forever preoccupied with these inferences from the direct to the oblique, which put a check to Scholastic logic and testified to the existence of a more general logic. This preoccupation is revealed in his correspondence with Placcius and Vagetius (Dutens, VI.1). These two students of Jungius had provided Leibniz with glowing reports of their master's teaching, especially in logic, and Vagetius was employed on the publication of Jungius's unpublished manuscripts. In 1681, he brought out a second edition of the *Logica Hamburgensis* (see LH IV 7C Bl. 151). Leibniz questioned them intently about Jungius's logical theories, notably about inferences from the direct to the oblique. (See *Specimen of the Demonstration of Inferences from the Direct to the Oblique*, sent by Leibniz to Vagetius, in Dutens, VI.1, 38. Cf. Chap. 6, §15.) In Leibniz's papers, there are also some of Jungius's lectures (*De dianoea composita lectiones coepta 4 Martii, finitae 23 Martii*; LH IV 7C Bl. 149-150), the *Tabula de Dianoea* already cited, an analysis of the *Logica Hamburgensis* (LH IV 7C Bl. 152-155), *Annotations to the Logica Hamburgensis* (LH IV 7C Bl. 162), and, finally, an entire notebook written in an unknown hand, containing the notes for a course by Jungius: *Joachimi Jungii disputationes noematicae habitae anno 1635 in collegio privato* (LH IV 7C Bl. 166-181). Unfortunately, a 1691 fire destroyed three quarters of Jungius's manuscripts before they were published (Leibniz to Placcius, 15 April 1691; Dutens, VI.1, 51); the rest are preserved in the Hamburg Library. See Guhrauer, *De Joachimo Jungio Commentatio historico-literaria* (Breslau, 1846).

[102] "It is true that in order to avoid inflections a roundabout way must be taken, yet it is of the greatest importance to reason quickly, even if you do not express yourself briefly" (LH IV 7B, 3 Bl. 26 verso).

foundation for its vocabulary. It is not a question, as it was in the attempts of Leibniz's predecessors, of assigning to each word a conventional and arbitrary substitute, but of finding a natural expression for each idea that conveys its logical composition and constitutes, so to speak, its formula. This is what we arrive at by definition, for to define an idea is to reduce it to simpler ideas and, finally, to absolutely simple and irreducible ideas, if we can continue the reduction by substituting in every case a new definition in place of the defined. With this done, we form the "character" of each idea from the characters that designate each of its elements.

Thus the name of each thing (or rather of each idea) would express its definition, and as all the properties of a thing follow logically from its definition, the name of a thing will be the key to all its properties.[103] This does not prevent the same thing from having several other names, insofar as it possesses different properties.[104] However, there will be one that is the key to all the others: the one that expresses the complete reduction of the idea into simple elements.[105] All this is explained by the combinatory, which always serves as a basis for the characteristic: the formula of a concept that is in any way complex can be reduced to "factors" in a variety of ways, but there is only one reduction to "prime factors," that is, to simple elements, and it is the latter that serve as the principle and explanation of the others.

Such a nomenclature, in which the name of each thing (or idea) would be an adequate and transparent symbol for it and, as it were, its description or logical portrait, would clearly constitute a sort of *natural* language, such as Plato dreamed of in the *Cratylus*. It would be the Adamic language, as it was called by mystics,[106] that is, the nomenclature that, according to Hebraic legend, the first man established in the terrestrial paradise and which men spoke until the confusion of languages at the Tower of Babel.[107]

17. We have seen how the idea of a universal language was developed and elaborated as Leibniz investigated its details more deeply. It was no longer a question of a type of disguised arithmetic whose use would require constant mental calculation,[108] but of a genuine spoken and written language, with sentences formed from nouns, verbs, and

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[103] Leibniz to Oldenburg (*Phil.*, VII, 13; *Brief.*, I, 102).

[104] Leibniz foresees that two names could be given to the same thing (for example, to a drug): a common one indicating simply its effect and use and a scientific (and if necessary even secret) name expressing its composition (LH IV 7B, 3 Bl. 12).

[105] Leibniz to Galloys, December 1678 (*Phil.*, VII, 23; *Math.*, I, 187).

[106] The *Natur-Sprache* or *Lingua adamica* of Jacob Boehme (*Phil.*, VII, 184, 198, 204; *New Essays*, III.ii.1).

[107] *Genesis*, II, 19-20: "and the name that Adam gave to each of the animals is its true name"; see also *Genesis*, XI, 6-7. Leibniz thought that this supposedly primitive language was certainly unknown to us (*Phil.*, VII, 205). Hermann von der Hardt asked him if the Adamic language was not Hebrew (Dutens, VI.2, 225). Leibniz replied, "Saying that the Hebrew language is primordial is the same as saying that the trunks of trees are primordial"; and he added that the only question is to know whether Hebrew is closer than the others to their common root, otherwise unknown, and that this would be the work of comparative philology (Leibniz to Tenzel, Dutens, VI.2, 232).

[108] "In order to speak this language, it will be necessary to be able to calculate certain things on the spot, at least to the point of knowing the larger Pythagorean table. Thus to speak this language will be nothing more than to express numerical propositions contained in the Pythagorean table, e.g. 6 x 8 is 48, or 48 is a senary." *A General Language*, February 1678 (LH IV 7B, 3 Bl. 3).

particles as in ordinary languages and capable of being written with ordinary letters.[109] Thus, when in 1680 Leibniz planned to present a fragment of his philosophical language by applying it to geometry, he announced that he would employ the inflections, particles, and constructions of Latin and would be content to invent new names to express the generation of figures and hence their construction or definition.[110] He is so far from conceiving of this language as a type of calculus that he expressly declares: "But I will mix nothing of calculus in this." He excludes all considerations of magnitude, equality, and proportion, which are common to arithmetic and geometry, and limits himself to the study of points, lines, angles, intersections, contacts, and movements, in a word, what are today called the projective properties of figures.[111] He thus hopes to be able to carry out all geometrical reasoning without figures and *without calculation*, using only the logical connections of concepts and the corresponding words. Such is the character of the universal language. Without a doubt it is always a logical and "rational" language, which serves as an aid and instrument for thought. However, it is no longer a logical algebra, and the proof of this is that the *calculus ratiocinator* is henceforth developed in parallel, yet in an absolutely independent manner, in the guise of a genuine algebra and not a spoken and written language.[112]

18. Leibniz was therefore led by the very progress of his project for a universal language, or rather by the development of the idea that was its principle, to surpass it. In order to construct the "alphabet of human thoughts" that was to be the foundation of the vocabulary, it would be necessary to analyze every concept and to reduce them to their simplest elements by means of definition.[113] But this would amount to making an inventory of human knowledge or even, as the analysis of concepts is at the same time the analysis of truths, to demonstrating all known truths by reducing them to simple and self-evident principles, that is, to constructing a demonstrative encyclopedia. On the other hand, once the primitive concepts were tallied and classified, it would be necessary to represent them with appropriate characters and to invent signs to express their combinations and relations. This was properly the work of the universal characteristic.[114]

Thus the true universal, or rather philosophical, language presupposed at once this huge, twofold labor: the establishment of a characteristic and the elaboration of an encyclopedia. These two enterprises in turn involve one another and must be carried out

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[109] "If I were to construct any characters at all, whether utterable or not, many things would be easier.... And so Dalgarno errs in thinking that it is equally easy to invent a language and a spoken character. I do not shrink from attempting a character first, for with this finally perfected, it will perhaps be easier to proceed toward a language" (LH IV 7B, 3 Bl. 24). Cf. LH IV 7B, 3, Bl. 49 (quoted in §5, n. 30).

[110] *A Specimen of the Philosophical Language Displayed in Geometry*, January 1680 (LH IV 6, 10b).

[111] See Chap. 9, §7.

[112] See Chap. 8, §9.

[113] *On the Method of Arriving at the True Analysis of Bodies and the Causes of Natural Things*, May 1677, ends with this sentence: "But this [namely the analysis of physical qualities] will be brought about splendidly through definitions and a philosophical language" (*Phil.*, VII, 269). In a copy of this fragment, Leibniz replaced "philosophical" with "rational" (LH IV 8 Bl. 39-42).

[114] Leibniz asserts that the universal language or writing is only a corollary of his characteristic (Leibniz to Rodeken, 1708, *Phil.*, VII, 32; cf. *Phil.*, VII, 25, and Chap. 4, n. 36). However, he does indeed affirm the possibility of a universal language and looks forward to its adoption, since he speaks of a *rational* and *universal grammar* that would be common to all national languages (Report to Councilor von Ilgen, 15 July 1709; *Phil.*, VII, 35).

in tandem, for the characteristic assumes that all scientific notions have been reduced to a logical system and brought under a small number of categories; it assumes, that is, that the encyclopedia has been completed or at least well advanced. The characteristic, on the other hand, appears indispensable to the establishment of the encyclopedia, for it serves to determine the logical connection of scientific truths and even the hierarchical order of the sciences.[115] In order to escape this vicious circle, the characteristic and encyclopedia would have to be elaborated in parallel and at the same pace. Leibniz understood perfectly this necessary connection between the two parts of his project, which was not the least of its difficulties.[116] For the moment it is enough for us to notice this connection and to emphasize the comprehensive plan of this huge undertaking. For the sake of clarity in our exposition, we are obliged to study the characteristic and the encyclopedia separately and successively, not forgetting, however, the bond that unites them.

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[115] "By this method of characteristic the order of the sciences to be treated will also become apparent" (*Phil.*, VII, 205; cf. 187).

[116] "The characteristic that I am proposing requires only one new species of encyclopedia. The *encyclopedia* is a body in which the most important human knowledge is arranged in order. With this encyclopedia completed according to the order I am proposing, the characteristic would be essentially finished, yet those who were to work on it would be unaware of its design, believing that they were only working on an encyclopedia. By itself, however, the encyclopedia would be extremely plausible and of great use. In order to complete it, it would be necessary to proceed in several directions at the same time. To this end, it would be good to establish a kind of society of some capable men in Germany, each of whom would work at his leisure on his own part according to the method that I would propose to them, which will assuredly be to the liking of persons of merit" (LH IV 7B, 3 Bl. 11, in Bodemann, 97; the first part only appears in *Phil.*, VII, 40).