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## Leibniz' Philosophy and Science Today

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## LEIBNIZ' PHILOSOPHY AND SCIENCE TODAY

Leibniz has been often considered our contemporary. We can see in him the prototype of the modern philosopher "who tries to make the universe intelligible, workable and useful."<sup>1</sup> His contributions to the contemporary science are well known; through his inventions and discoveries he has foreseen the growth and role of technology in our world or today; finally, his tendencies towards rationalisation of social life, reconciliation, unification and supranationalism have been incarnated in the present civilisation. The question arises: "could Leibniz still be relevant to our civilisation that seems to have already fulfilled his great vision?"

There are, however, two important points concerning Leibniz' thought that merit our attention and will show that in spite of its vast reverberations Leibniz' thought has not yet been sufficiently explored.

1. Our "best of the possible worlds" is often said to be in a philosophical crisis. The new "enlightenment" having demythologized nature seems to have alienated man from nature and the world as much as it seems to have cut man's ties with the supernatural in all its forms. Allegedly, the scientific and technological progress is to be blamed for man's loss of a "place of belongings" since science in which the contemporary man has put absolute faith does not seem to be in any way relevant to the problems of his individual, personal life. And yet, opposing this contention, we will go back to Leibniz and show that the reasons for this crisis do not lie in the nature of science and technology but in their inadequate interpretation in relation to philosophy. Leibniz' theory of the universal science will point the way towards overcoming of these difficulties.

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<sup>1</sup> Brunner, *Études sur la signification historique de la philosophie de Leibniz*, Paris 1950, p. 289.

2. A paradoxical statement may be ventured. In spite of a great progress in Leibniz' scholarship accomplished recently, the understanding of Leibniz' philosophy in his writings is far behind the vast direct and indirect reverberations of his thought in science and civilisation. Leibniz' philosophy and metaphysics have developed as a response to the concrete great problems science was facing in his time, since he, Leibniz, like Aristotle has been a scientist *par excellence* and as Fontenelle said: "pareil en quelque sorte aux Ancients qui avaient l'adresse de mener jusqu'à huit chevaux attelés de front, il mena de front toutes les sciences." And yet, although the role of psychology, physics, dynamics and natural science in Leibniz' metaphysics have been acknowledged, a panlogistic bias in the interpretation of Leibniz' doctrine seems still to be prevalent especially in the Anglo-Saxon circles. Since Wundt's almost isolated essay no attention has been paid to the role of biology in Leibniz' metaphysics. This *mise au point* that the recent progress on scholarships<sup>2</sup> makes imperative will give a final formulation of an unbiased perspective in which Leibniz' thought should be viewed.

We hope to gain through these two arguments a deeper insight into Leibniz' endeavour. This insight will allow us to draw some conclusions concerning the question of the relevance of Leibniz' philosophy to the present day philosophical research.

#### PHILOSOPHICAL FOUNDATION OF SCIENCE, TECHNOLOGY AND THE SOCIAL WORLD

Already in his time Leibniz has been recognized as a universal genius. Not only did he advance through his discoveries such sciences like mathematics, physics, dioptrics, historical research and founded other sciences like geology, analysis situs, dynamics, but next to the scientific theory Leibniz has been vitally interested in their application. He seems to have believed that the truth-value of a theory may be tested in its practical application, since once have we discovered the "mysteries" of nature we might well imitate nature itself. He claimed to have invented a considerable number of instruments and machines.<sup>3</sup> Among the machines to which he has attributed a specific importance were instruments that could, as he claimed, perform algebraic and logical operations, but even such operations as to deduce all knowledge from a certain number of presuppositions. We see clearly that in his far-reaching vision Leibniz saw the great possibilities of science which discovering the workings of nature itself on the one hand and of the human knowledge on the other hand, has in our time brought about

<sup>2</sup> A. T. Tymieniecka, *Leibniz' Cosmological Synthesis*, Van Gorcum 1964.

<sup>3</sup> Letter to Herzog Johann Friedrich, Oct. 1671.

such a farreaching mastery of man over the natural forces on the one hand, and over his rational powers on the other hand, that nothing seems to resist its grasp.

And yet the tremendous scientific and technological development which has not only considerably changed the conditions of human life but has also the tendency to replace many of man's functions previously considered as his specific prerogatives through mechanically operated instruments, like electronic brains not only calculating and translating but inventing music and making decisions, and which would have enchanted Leibniz, who could truly be considered as its forerunner, initiator and guide, has caused a profound stir, discomfort and anxiety about the meaning of life, the role of man in the universe etc. On the one hand, through science man became seemingly master of nature and has freed himself from its bonds. On the other hand, science has been accepted uncritically as the ultimate answer to all human queries, and questions which reach beyond the limits of positive scientific concepts are dispensed with as false questions. Thus man has been freed from the vision of the world, himself and transcendence bound in a consistent whole as based upon esoterism, superstition and mystification. "Enlightened" by what he considers the final word of science and progress, man is expected not to seek any more a finalistic explanation of his endeavours and of the meaning of his life in a transcendent principle. Man stands isolated and alone, left entirely to himself, to the use of commodities, science and progress incessantly augmenting and centered upon his positive achievements, which, however, cannot give a meaning to life. His only strength and comfort is the illusion that he has found in the progress a definitive clarification of his status in the universe.

Questions, however, arise: 1. whether it is really science and technology that could have given such an interpretation of their results and whether their results do contain decisive factors to prove their final significance? 2. Is it really true that science and technique can handle all their problems themselves? 3. Can the fact that certain essential aspects of man's functioning may be performed by automata such as electronic brains, dispense with metaphysical questions concerning the ultimate nature of man, of the universe, of their mutual relation?

It is not without interest to consider these questions in the light of Leibniz' thought, who having seen the possibility of the contemporary developments in science and technology in their roots has, however, evaded the bias of a onesided specialist of our day. As a matter of fact, all Leibniz' discoveries, inventions and ideals stem from a common ground; they are merely three faces, intelligible, theoretical and practical of his great project of the universal science, *mathesis universalis*. He did not pursue particular sciences like mathematics,

geology, dynamics in separation from each other. On the contrary, Leibniz saw all the particular branches of knowledge as emergent from a common foundation that would contain the universal rules of discovery and invention unifying them all at their roots but allowing the development and specialization of their particular methods in relation to their respective subject matter and objective. The so understood universal science was meant by Leibniz as philosophical in nature and consequently as mediating between the strictly scientific questions and those concerning man as an experiencing individual.

The project of an universal science, of an universal language, or of a science of characters comes from his earliest youth. Already in his boyhood Leibniz was fascinated by Aristotelian categories. He tried to grasp the universe of knowledge, first, by analyzing it into elements and then, by categorizing them. Who did not, discovering in adolescence the power of reason cherish a similar dream? Yet, Leibniz gave to this dream a profound meaning and has passionately pursued it all his life. In his essay *Dissertation on the Art of Combinations* Leibniz tries for the first time to apply his ideas, that "a kind of alphabet of human thoughts can be worked out and that everything can be discovered and judged by comparison of the letters of this alphabet and an analysis of the words made from them" to particular sciences.<sup>4</sup> Universal science is meant, first, as a complete inventory of knowledge presented in exhaustively analyzed characters, such that although each branch of knowledge exhibits a different kind of fundamental character, yet, all of them could be brought to a common denominator. Second, Leibniz opposes the arbitrariness of nominalism by trying to establish that although the choice of words in signifying objects or expressing definitions may well be arbitrary, yet thought, before it is expressed by words, is expressed by "some other signs"<sup>5</sup> which are not arbitrary but have a direct relation to the "nature of things."

The assumption of a direct relation between the "signs" or characters and nature is of a major significance for Leibniz' thought. Once analysis would bring forth the order of the interrelations among the characters within a given section of knowledge and the rules of their variations, we would have the key to the secrets of nature. A system of such interrelations and rules would reveal the system of the workings of nature itself and its rules. Having made these basic discoveries we would be in position to gain control over nature by using its own laws and rules towards devising methods for invention. Finally, encompassing the totality of data, as well of knowledge as of reality, we

<sup>4</sup> "On the General Characteristic," in *Philosophical Papers and Letters*, p. 341, transl. L. E. Loemker, Chicago U. Press, 1956.

<sup>5</sup> August 1677, *ibid.*, p. 278.



could gain control over it in a synthetic way by devising rules of a philosophical calculus that would allow us to weigh and solve in a dispassionate, noncommittal, rational way questions in all realms of knowledge and *praxis* extending from the scientific field to the social, political, moral and even religious domains.

One cannot fail to recognize in this program the accomplishments of the contemporary science previously mentioned. And one would be tempted to compare the mathematical substructure underlying considerable parts of the research in behavioural, natural mathematical, social sciences and extending even into linguistics, with Leibniz' dream of a universal foundation of knowledge. This parallel is indeed striking and yet we must be cautious in its interpretation. A crucial point has to be emphasized. First of all, the concept of the universal science in Leibniz' thought cannot be identified with the problems of methodology. The fact that in advanced treatment various fields of knowledge may be treated by similar or the same structural or operational models and methods is not yet the proof that all of nature and reality, or even all their essential aspects may be reduced to this common dimension. And identifying the essential characteristic of any realm of cognition with the structural or mathematical characteristic is to bring it simply to the mathematical dimension of this realm.

However interesting it might be that there is such a common dimension in so many domains of science we do not know so far what would be its relation to other possible dimensions of this domain neither of its relation to the specifically "characteristic" dimension of this domain. Leibniz' idea of the universal characteristic poses it above every particular, be it mathematical, algebraic, logical, moral, natural dimension. Although Leibniz has been at first tempted to identify universal science with mathematical sciences and to conceive of the philosophical calculus as a numerical calculus and saw in number "a basic metaphysical figure,"<sup>6</sup> yet progressing in his development he has emphasized more and more the contingent nature of the universe, of nature as the realm of life, limitless divisibility, evolving nature of the individual substance, opposing its ungraspable essence to that of the ideal realm of possibility, as *veritates contingentes* (*veritates facti*) to *veritates necessarias* (of the ideal realm of the possible).<sup>7</sup>

Furthermore, he arrives at the differentiation of metaphysics from mathematics and other sciences upon a similar ground: "...mathematics carry with them their proofs and corroborations which is the principal cause of their success; whereas in metaphysics we are deprived of this

<sup>6</sup> Cf. "On the General Characteristic," *ibid.*, p. 340.

<sup>7</sup> *De Scientia Universalis seu Calculo Philosophico*, Erdmann (facsimile) p. 1684,

advantage.”<sup>8</sup> He summarizes his view in a letter to Arnauld writing: “One should always explain nature mathematically and mechanically, provided one knows that the very principles or laws of mechanics or of the force do not depend upon the mathematical space alone but on some metaphysical reasons.”<sup>9</sup> And already a few years earlier Leibniz has stated that mathematics itself is only a branch of the science of characters—may be more developed and rational—among other particular sciences. In a letter to Henry Oldenburg he writes: “I have come to understand that everything of this kind which algebra proves is only due to a higher science, which I now usually call a *combinatorial characteristic*.”<sup>10</sup> Thus the universal characteristic in Leibniz’ thought has a status independent of specific methodological problems. And for a good reason.

Indeed the philosophical meaning of the universal science does not lie either in its practical application nor in its function of unifying the whole system of human knowledge. To keep things in proportion: electronic brains do not rise a philosophical problem because they perform mental operations of man and even exceed his mental powers; it is still man that has to devise, invent, operate them and interpret their results. The philosophical problem lies in the relation between the nature of existing reality such that man may discover its “characters” and rules and apply them; that is, the philosophical problem lies in the relation between the nature of reality, of man and of cognition itself.

For Leibniz the possibility of the universal science raises a crucial philosophical question which none of the particular branches of knowledge could answer on its own account. “If characters can be applied to ratiocination, there is in them a complex mutual relation or order that fits the things, writes Leibniz and the great question emerges: “What is the true basis upon which everything can be attributed its characteristic number?”<sup>11</sup>

In different terms, none particular science may inquire into the principles of its own methodology. These principles concern the conditions of knowledge itself as a human enterprise on the one hand and as revealing the workings of nature on the other hand. As far as scientific research might progress in its discovery of the positive features and laws of man’s functioning and of this of nature, as far as it might penetrate into and clarify the rules of the cognition itself, it will not be able to avoid the question of the ultimate relation be-

<sup>8</sup> “On the Reform of Metaphysics and of the Notion of Substance,” transl. Duncan in *Philosophical Works of Leibniz*, 1890, p. 69.

<sup>9</sup> 14 July 1686, Gerhardt.

<sup>10</sup> Dec. 28, 1675. In Loemker, p. 257.

<sup>11</sup> “On the General Characteristic,” *loc. cit.*, p. 341.

tween the universe of things and beings and human mind, and the question of the significance of man, who is not only an integral, living part of nature, but may himself inquire into its laws and control them.

Leibniz' metaphysical system of the individual substance and of the preestablished harmony is an attempt to answer these meta-scientific and meta-methodological questions. Since his time, however, the tremendous amount of new data flowing incessantly in from all fields of inquiry offers an amplified basis for the reformulation and a new treatment of these questions. Instead of drawing unwarranted conclusions from the scientific progress about the absolute and ultimate status of scientific statements, conclusions that no science entails, and instead of arbitrarily limiting the range of questions to be seriously asked to those that positive science can solve, we should acknowledge with Leibniz the meta-scientific and meta-methodological roots of science itself asking after its philosophical foundations.

A novel attempt at answering the question "What is the true basis upon which everything can be attributed its characteristic number?" upon a vast ground of new scientific evidence could give: 1. a novel meaning to science as a human enterprise, 2. a truly "enlightened" significance of scientific and technological results for individual human life, 3. an adequate evaluation of man's place in the cosmos, 4. an elucidation of man's specific drives and nostalgies towards a destiny higher than those of other elements in nature in relation to supernatural factors.

Instead of being arbitrarily dismissed as "poetry" or confined to the clarification of scientific concepts and of the ordinary language, or satisfied with mind's constructive imagination remain busy with its pursuit, philosophy could assume the role of interpreting science and progress to man. This role to which science itself compels it would bridge the present hiatus between the two and allow man to reconstruct his universe around him, making again the world a congenial place of his belonging.

#### TOWARDS THE BALANCE BETWEEN LOGIC AND NATURAL SCIENCE IN LEIBNIZ' THINKING

The problem of the relation among sciences brings us directly to our second argument.

Generations upon generations of philosophers drew profound inspiration from Leibniz' thought. They incorporated many of Leibniz' ideas into their own theories. Whereas his body of doctrine with its many-sided aspects, various tendencies and large spectrum of points of view combined in one vertiginous philosophical reconstruction has



hardly found an appropriate evaluation. Perhaps the vast range of Leibniz' interests might be responsible for the fact that study of his work has developed by fragmentary and onesided approaches. Scholars presenting and interpreting his philosophy have introduced a distorting bias reflecting their own limited perspective, not Leibniz. Interpretations abound showing his thought respectively as panpsychic, panvitalistic, panmonistic, panenergetic, panfinalistic, panspiritualistic, panlogistic etc. In spite of a considerable progress accomplished recently in Leibniz' scholarship in French and German researches, the panlogistic approach stemming from the tendency of the late 19th and early 20th century scholarship seems to prevade still Leibniz' understanding, especially in the Anglo-Saxon philosophy distorting his thought and precluding the access to its appreciation and evaluation for the present day reflection. The domination of this bias seems to be due, at least partly, to the neglect of an other, equally important source of Leibniz' philosophical inspiration which has influenced him in his major philosophical decisions, namely of his roots in the natural science of his day. Although the recent research has, on the one hand, accomplished a few essential steps towards establishing an autonomous and central role of Leibniz' metaphysics, and, on the other hand the role of natural science in his metaphysical thinking has been pointed out and proved at least in certain realms like dynamics, the panlogistic bias may be definitely dispelled once we clearly and succinctly confront the elements of Leibniz' mathematico-logical inspiration with those gained from physico-biological reflection. The so established balance will open a new perspective upon Leibniz' thinking within which a proper and adequate appreciation can be given to his wide spectrum of concepts and intuitions in their original, irreducible features.

To restore to the interpretation the balance between the logical and the natural element intrinsic in Leibniz' thought means to bring to light the wonderful proportion that Leibniz' thought has achieved between the strict rigour and contingent fluidity, between necessary connections and unpredictability of the natural course of life, between the strict rational order and the infinitely divisible and expanding universal process of nature.

L. E. Loemker, in his most recent review of Leibniz' scholarship today writes: "It is no longer necessary, after the work of Kabitze and others, to refute the argument of Couturat that the metaphysics of Leibniz is made to rest entirely upon his logic, but it is nonetheless important not to lose sight of the fact that Leibniz did propose in the early Hannover years, and never later repudiated, a panlogistic metaphysics in which the divine perfections or perfect attributes themselves constitute, in finite measures, the primary qualities out of which God,

by calculating, makes the world and the individuals in it." <sup>12</sup> For support Loemker brings *Primae Veritates, Discours de Métaphysique*, the *De Analyse et Synthèse* and quotes in particular Leibniz' comment to the little *Dialogue* of 1677 which reads: "Cum DEUS calculat et cogitationem exercet, fit mundum."

After our effort to establish previously the relation of particular sciences and methods to the universal science and the following from it two different (if not three) meanings of "calculus" and "calculating" Loemker's statement appears surprising.<sup>13</sup>

From the point of a textual scholarship, there is indeed a certain difficulty since although it is universally recognized that there are two distinctive phases in Leibniz' thinking, the second of which with a turning-point in the 1690s, yet Leibniz has not expressly repudiated his ideal of mathematical and logical rigour. However, if we approach this question from the inside of his philosophical thinking and recognize the pluridimensionality of his thought we see that there is a *tertium quid* between the rigour of the necessary but merely possible and the flux of life. It is only as a *tertium quid* that the individual substance or monad on the one extreme, and the universal harmony on the other extreme in the interplay of a constitutive system of the universe may account for the crucial philosophical question emerging from the idea of a universal science. Here we limit ourselves only to dissociate on main points of Leibniz' metaphysics seen from the inside, the logico-mathematical and the empirico-natural aspects which will dissipate the remnant of the panlogical prejudice. The question is not whether Leibniz has abandoned his ideal of rigorous organisation and expression in favour of a less rational, vitalistic conception, but how he brings them into proportion in which the role of logic being acknowledged, yet the youthful idea of its absolute pre-eminence upon a subsequent corroboration of his ideas vanishes.

There can be no doubt that Leibniz' earliest thinking has been cast in a logical frame. Neither would anyone deny that his first philosophical interests were intertwined with logical ones. Furthermore, throughout his life Leibniz aspired to the ideal of logical clarity, exhaustiveness and completeness in structuration and definition. He realized, however, also and quite early that there is only a limited realm of knowledge where such complete and precise definitions are practicable. Drawing upon the evidences gathered from his practice in jurisprudence and his great interest in the empirical science of his time, Leibniz makes a radical distinction between the rational and the empirical

<sup>12</sup> L. E. Loemker, "Leibniz in Our Time. A Survey of Recent Leibniz Literature," *Philosophische Rundschau*, November 1965, p. 81—111.

<sup>13</sup> A. T. Tymieniecka, *op. cit.*, p. 21—41.

intuition.<sup>14</sup> The first applies only to relations, whereas the objects of thought can be grasped only by empirical intuition. In fact objects of thought can never be absolutely grasped and known.<sup>15</sup>

This primacy of the empirical intuition in cognition of the world that at this early point breaks through Leibniz' genuine faith in reason, logical principles and rigour is of crucial importance for Leibniz' further development. It will pave the way for further insights into laws of nature, into increasing insistence of counterbalancing the study of formal logic by logic of probabilities which Leibniz has urged forthwith.

But there are other reasons which make us doubt that there has been really any turning point in Leibniz' thinking rather than a simple shift of emphasis upon his interests, of interests which have been present all the way in his mind. To trace in a few points the origin and formation of his metaphysical system let me point out, concerning the individual substance, that:

1. Some of the basic features of the monad seem already to be prefigured in Leibniz' *De Principio Individui* (1663). This stresses individuality, indivisibility and completeness of the individualizing principle. It was Leibniz' concern for completeness of features which made him reject the *haecceitas* of Duns Scotus.

2. Also in the earliest association with Weigel in the same period we may trace the notion of the *conatus* or striving force which has opened the door to his dynamics.<sup>16</sup> This culminated later in the dynamic spontaneity of the individual substance.

3. Leibniz' serious studies in mathematics and logic stem from a relatively late Paris period. Whereas still in a pre-logical time in Paris, Leibniz has been deeply impressed by passionate discussions around Theodor Korckring's thesis (1672).<sup>17</sup> Korckring proposed the theory that man originates from the egg, containing already all the prerequisites for his development. The claim of selfdetermination, independence from exterior factors, and of a selfgoverning agency of living beings contained in this theory seems to fit very well with the previously mentioned points; we find its almost direct transposition in the theory of the individual substance, as it is formulated in the *Discours* (1686).

4. Leibniz might have expounded his points of view on nature and the universe much longer in his later period, yet in the *Discours* not only do we have already the above enumerated echoes from Leibniz'

<sup>14</sup> *De Stilo philosophico*, Nizoli and Erdmann, facsimile.

<sup>15</sup> A. T. Tymieniecka, *op. cit.*, aims at elucidating the unity of Leibniz' multifarious ideas through the idea of an underlying "constitutive system."

<sup>16</sup> Martial Guérault, *Dynamique et métaphysique leibniziennes*, Paris 1934, p. 24.

<sup>17</sup> *Ostogenia Foetum et Antropogenia ichnographia*.

interest in natural science but the feature of the individual monad as originating only by creation and having no other end possible but annihilation is in correspondance with Arnauld brought back directly to the studies of Swammerdam and Leewenhoeck, and their research about the progressive transformation of animals.<sup>18</sup>

5. Leibniz' work in physics gave to the monad another essential feature, that of spontaneity and life. Under the influence of Huygens, whom he met in Paris and against the Cartesian notion of a passive space, Leibniz has developed the conviction that there is nothing in matter without life.<sup>19</sup> It is not necessary to stress how well the idea of *vis viva* corroborated in the notion of substance Leibniz' early conception of the *conatus* or striving force.

From this brief chronology we see that the notion of the individual substance, the cornerstone of Leibniz' philosophy and metaphysics, had all the basic features already in the *Discours*, but all its basic elements have been already waiting for this decisive formulation before Leibniz entered in his logical period, that is before he has invented the logical calculus (some time about 1678). The individual substance is already in germ, individual, spontaneous, indivisible, autonomous that is self-sustaining and selfsufficient, containing within itself his destiny and its laws. It is projected as an immaterial principle of order, articulating the world of agregates and animating it through its spontaneity and life.

When about 1677—9, inspired by his invention of the logical calculus, during his stay in Paris, Leibniz has devised the *notion complète* of the substance, namely that it could be grasped and expressed in a logical way as a subject containing all his predicates, all the "substantial" hyletic features of the monad were ready to be put in his final logical formulation. But all these (or almost all) features come from extra-logical, and to a considerable extend physico-biological sources of inspiration. *La notion complète* of the substance expresses only one of its aspects, this of its selfcontained autonomy, whereas the significance of the monad for Leibniz' metaphysical edifice as a cornerstone of the process of nature on the one hand, and of the creative planning, on the other, relies to the same degree on its spontaneity, vitality, indestructibility, selfgoverning agency which give the concrete ground for the logical formulation.

<sup>18</sup> Letter to Arnauld, Oct. 9, 1687, ed. Georges Le Roy, Paris 1957, p. 189.

<sup>19</sup> Dialogue *Pacidius Philalethi*, Couturat, p. 594—627; also in his letter to Remond de Montmort (1714) Leibniz wrote: "Il est vrai que je n'entrai dans les plus profondes qu'après avoir conversé avec M. Huygens à Paris. Mais quand je cherchai les dernières raisons du Mécanisme et les lois mêmes du Mouvement, je fus tout surpris de voir qu'il était impossible de les trouver dans les Mathématiques, et qu'il fallait retourner à la Méthaphysique." Erdmann, p. 702.

Leibniz' later stress upon the organic nature, the macrocosmic process of the universe and the monad as the vital principle seems to be merely a counterpart to his earlier stress upon the exemplary perfection of the mathematical and logical rationality and expression. But he has been always aware of both.

The "demystification" of the logical preponderance in the notion of the individual substance is not without importance for the final elucidation of the alleged panlogism at the level of the universal harmony and creation. As we have already pointed out it is the nature of the "calculus" which Leibniz attributes to the creative factor in estimating the capacity of the universal scheme of the possible world and the compossibility of individual substances to coexist within one and the same scheme, that is the great question. But two other factors have to be considered: 1. the nature of the universal harmony to be established, 2. what role does the individual substance play in the final calculation.

The notion of the preestablished harmony, second in importance only to that of the individual substance has been often considered as a metaphysical correlate of Leibniz' *analysis situs*, in fact as its direct transplantation from geometry to metaphysics, emphasizing the aspect of the preestablished harmony as the organisatory pattern. Next to this aspect however, there is the role of the preestablished harmony in the actual coming of the universe into existence. Indeed, it is as early as in 1666 that Leibniz, pondering over the reason why some beings exist and not others, sees the ultimate reason for existence in the principle of choice writing that "the intimate principle of things is the universal harmony."<sup>20</sup> Leibniz writes to Arnauld: "It was therefore not because of the resolution made in respect to Adam, but because of the resolution made at the same time in regard to all the rest (to which the former involves a perfect relationship) that God formed the determination in regard to all human events."<sup>21</sup>

We have previously examined carefully the nature of the pre-established harmony in terms of the universal creative pattern in which the laws of compossibility among substances entering into it give the basis for the creative planning of the universe.<sup>22</sup> We have distinguished in this respect between the possibility as a strictly rational concept, as simply not involving contradiction, and "compossibility"—an existential concept which Leibniz defines as an adjustment to the system of connections with the rest of the universe.<sup>23</sup> We have also

<sup>20</sup> An autobiographical fragment from 1666. Cf. Foucher de Careil, *Mémoire sur la philosophie de Leibniz*, I, 11/2.

<sup>21</sup> Letter to Arnauld, July 14, 1686, transl. Montgomery, p. 120.

<sup>22</sup> Cf. A. T. Tymieniecka, *op. cit.*, Part II, "The System of Laws" and 3, 4, 5.

<sup>23</sup> In order that something be compossible writes Leibniz: "c'est-à-dire admissible à l'existence actuelle, il faut connaître sa connection avec le reste de l'univers." Letter to Bourget, Dec. 1714, Gerhardt, III.



tried to establish in the present essay that not only *la notion complète* of the substance, as its logical aspect, could not account for the fundamental features of the monad that makes it the principle of the phenomenal world and the cornerstone of the universal pattern, but that the internal nature of the monad which contains "a law of the continuation of the series of its own operations,"<sup>24</sup> cannot be simply conceived as the law of the mathematical series, because it could not account for the organically unifying, qualitatively contingent nature of what it unifies, and that the type of the "unification" of the successive stages itself is not a mere sequence of order but a dynamic, specifically vitalistic and productive motivation. Consequently, we have insisted upon the specific "substantial unity" of the monadic inward structure involving dynamism and order in opposition to the mathematical law of the series as applying and expressing order alone. If we ask now, how in view of these conceptions both of the monad as of the universal harmony thus elucidated, could have Leibniz understood the principles of the planning, selection and creative mechanism it follows that:

1. As Leibniz has always insisted upon a project of a "philosophical calculus" as applicable already to the universal science of characters to which neither logical nor mathematical calculus would have sufficed, there is no reason to believe with Loemker,<sup>25</sup> as it seems, that the way in which the creative factor (God) "calculates" the compossible elements of the world thereby emerging should be identified with ether, the algebraic or the logical calculus. On the contrary, a specific meaning of the "philosophical calculus" should be sought.<sup>26</sup>

2. If already for the organisation and manipulation of the system of the universal characteristic, in view of the contingent nature of the universe, a specific philosophical calculus had to be accepted, how can we imagine that the same universe of things and beings envisaged *sub specie creationis* could be grasped by a particular type of operations applicable adequately merely to the "truth of reasoning" but not to the "truth of fact."

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<sup>24</sup> A. T. Tymieniecka, *op. cit.*, Part I, chap. 1, section 1, "The Monad and the Law of the Series," p. 107—116.

<sup>25</sup> Cf. Loemker's previously quoted article in *loc. cit.*, p. 99.

<sup>26</sup> We seem to be in agreement with Gottfried Martin's distinction between scientific and metaphysical logic in Leibniz' thought. Cf. Leibniz, *Logik und Metaphysik*, Köln 1960. However a question arises: can the creative "calculatio" which is only a super-rational planning (the Creator "knows" the substances not in their existing successive unfolding but all at one glance, which seems to be an entirely different type of "rationality" than human rationality) but simultaneously bringing into existence what Leibniz calls "fulguration" or "emanation," that is both rational and dynamic, be identified even with the "philosophical calculus" dealing at the level of human rationality alone? Even this is certainly not sufficient.

3. Considering that already the material to be "calculated," that is the individual substances which then have to be considered from all possible angles in order to adjust to the creative pattern of the world—their existential condition—cannot be grasped by strictly rational formula otherwise but merely in their type of organisation, it seems indispensable to assume that Leibniz could not have identified the creative deliberation with any singular type of rational operation.

The misunderstandings underlying the prejudice of Leibniz' "panlogism" seem now dispelled not only on one extreme point of his system, that of the individual substance but also on the opposite extreme point, that of the universal harmony and of the creative planning.<sup>27</sup> By the same stroke we hope to have shown that all along with his generally emphasized ideal of a strictly rational, mathematical and logical, structuration and formulation, Leibniz has, albeit with varying intensity and emphasis, considered and adequately evaluated the empirical evidence of natural science concerning the contingent nature of the universe and man.

Only in this full-fledged perspective, which Leibniz himself has well outlined in his autobiographical *New System of Nature and Communication of Substances* may we rise to the authentic meaning of Leibniz' reflection.

In concluding: The enormous progress "in the main articles of knowledge" has, on the one hand, led to enormous specialization in each field, on the other hand, created an illusory faith in the selfsufficiency of particular sciences and their consequent independence from philosophy. Their increasing methodological unity, however, does not solve the philosophical questions which its very possibility seems to raise. An inquiry "to guarantee the unity to the body of knowledge whereof all the parts were properly connected" belongs clearly to philosophy. To develop such a new foundation interpreting scientific results and progress for human place in cosmos and his life from the ground of the new scientific knowledge of the present, yet mindful of the philosophical wisdom of the past is the grand philosophical task that Leibniz proposes for the future.