Explication. Le texte qui suit paraîtra prochainement dans un volume spécial de *Foundations of Science*. Il développe une contribution au volume que les Presses Universitaires ont récemment publié en l'honneur de Jean-Louis Le Moigne ; développement qui, à son tour, se trouve notablement développé dans un troisième travail, comme l'indique la note qui précède l'Abstract.

L'évolution mentionnée implique certains invariants qui pointent vers un noyau dur de mes vues dont il serait artificiel et même détériorant de vouloir modifier l'expression tant que, à mes yeux, elle continue d'indiquer exactement l'état de choses que je voulais communiquer. Je prie donc les éventuels lecteurs des trois versions successives d'excuser les fragments répétitifs.

OBJECTIVITY AND DESCRIPTIONAL RELATIVITIES

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> «That a higher integration of science is needed is perhaps best demonstrated by the observation that the basic entities of the intuitionistic mathematics are the physical objects, that the basic concept in the epistemological structure of physics is the concept of observation, and that psychology is not yet ready for providing concepts and idealizations of such precision as are expected in mathematics or even physics. Thus this passing of responsibility from mathematics to physics, and hence to the science of cognition ends nowhere. This state of affairs should be remedied by a closer integration of the now separate disciplines.»
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> E. P. Wigner [1]

Note. This work has been the kernel of another much more extended one, *Quantum Mechanics versus a Method of Relativized Conceptualization*, already published in a collective volume of the *"Centre pour la Synthèse d'une Épistémologie Formalisée"* (*CeSEF*) titled *Proposals in Epistemology : Quantum Mechanics, Cognition and Action*, M. Mugur Schächter and A. Van der Merwe, eds., Kluwer Academic Press, 2002. The mentioned development contains a thorough account of a relativized genetic logic and a relativized genetic theory of probabilities which emerge inside the general method of relativized conceptualization exposed hereafter. These are not exposed in what follows. Furthermore, inside the collective volume the method of relativized conceptualization gains rich overtones from the general environment generated by all the other contributions to our common attempt to erect a formalized epistemology drawn from the present stage of the most important nowadays scientific approaches.
Nevertheless in what follows one can find a self-contained and already quite elaborate exposition of the method of relativized conceptualization.

ABSTRACT

A general representation of the processes of conceptualization, founded upon a descriptional mould drawn from fundamental quantum mechanics, is outlined. The approach is called *the method of relativized conceptualization*. This stresses that the representation is not researched as a "neutral statement of facts" but, from the start on, as a *method* subjected to definite descriptional aims, namely an *a priori* exclusion of the emergence of false problems or paradoxes and of any gliding into relativism. The method is characterized by an explicit and systematic relativization of each descriptional step, to all the descriptional elements involved in this step, namely: the epistemic action by which the object-entity is generated, the object-entity itself, and the epistemic

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[1] Wigner E.P., (1967, p. 37) *Symmetries and Reflections*, Indiana University Press.

action by which the object-entity is qualified. Successive steps which complexify progressively a given initial description, form an unlimited chain of *cells* of conceptualization where the very first cell, necessarily, is *rooted in as yet strictly unconceptualized physical factuality* while the subsequent cells consist of increasingly abstract descriptions that are connected hierarchically. The chains interact at nodes where they branch, thus generating an indefinitely evolving, complexifying web of relativized conceptualization, free of ambiguities, and where each element stays under control.

The method contains the *posited* assertion of a realism of which a definite sort of minimality *follows* then inside the method. This generates a clear distinction between illusory qualifications of "how-a-physical-entity-is-in-itself", and *models* of this physical entity. Thereby a worked out connection with philosophical thinking is incorporated in the method.

The method is shown to entail a critical view concerning classical logic (the deeply innovating and unifying influence of the method of relativized conceptualization, upon logic and probabilities is thoroughly exposed in another work of which the present one had been the kernel).

The relations between the general method of relativized conceptualization and the relativistic approaches in the sense of modern physics, are specified. These last ones, in contradistinction to the method exposed in this work, are shown to concern *exclusively* the ways of constructing qualifiers of object-entities so as to insure intersubjective consensus among corresponding classes of observers ; while the ways of generating the object-entities which are qualified, and the consequences entailed by these ways, are not considered: like in the classical logic, like in the whole classical thinking, the object-entities are simply presupposed to always pre-exist available.

Traditionally, the emergence and elaboration of knowledge has always been studied from a point of view founded on psychological and neurobiological data, and in the spirit of a "neutral" account of the natural phenomena. Tthe modern cognitivistic approaches continue this tradition. The approach exposed in this work is probably the very first one in which a systematic representation of the processes of creation of knowledge is founded on *strategic* data drawn from physics, and correlatively, is constructed from the start on as a method for the optimization of these processes *themselves*, accordingly to definite aims.

I. INTRODUCTION

The concept of scientific objectivity is undergoing a revolution. The classical concept of objectivity was tied with the posit that science just *discovers* truths that are independent of any human aim-and-action, preexisting "out there" such as they appear when discovered. But throughout the last century this view kept receding. It became increasingly clear that objectivity in the classical sense was an illusion ; that scientific knowledge is *constructed* under certain constraints that characterize the epistemic situation and the epistemic aim of the acting observer-conceptor and imprint upon the result non removable descriptional *relativities* to this situation and this aim. More or less implicitly awareness of quite essentially involved [epistemic situation)-(epistemic aim)] structures developed steadily, perturbing the classical conception about objectivity while instating a new concept of objectivity in the sense of inter-subjective consensus.

So far however only few have gained already a clear cognizance of this evolution. Correlatively, on a meta-level, a fully organized and general view on the epistemic actions by which scientific inter-subjective consensuses are achieved, is still lacking. What, exactly, in scientific consensus, insures subjection to *also* what is called reality and truth, thereby transgressing mere conventionality and withstanding relativism ? How, exactly, do the involved human aims and features come into play ? What sorts of strategies are brought into play in order to construct inter-subjective scientific consensuses ? While such questions struggle for definite answers, the inertial forces that work inside language bring forth again and again the same old word

- objectivity - to designate indistinctly either the emerging new concept, or the classical one. This favors the persistence of many circularities and confusions.

In what follows I show that the sort of scientific knowledge constructed in modern physics *varies* radically as one shifts from fundamental quantum mechanics, to the theory of relativity and to relativistic approaches in general.

Fundamental quantum mechanics incorporates - implicitly - a peculiar type of "basic" descriptional relativities which insert the very *first* stratus of conceptualization deep into purely factual physical reality. It will appear that the descriptional relativities of this "basic" type, when entirely explicated and then generalized, lead toward *a recasting of epistemology*. The main lines of this major consequence of the quantum mechanical strategy for constructing knowledge will be briefly exposed as *a method of relativized conceptualization*. This method, while it unifies modern physics with philosophy, will be shown to entail also a more specific non classical unification between set-theory, probabilities and logic.

On the other hand, inside the theory of relativity and more generally inside the whole class of relativistic approaches, there have been developed *another* sort of methods for constructing inter-subjective consensuses. These - much better recognized than those involved by fundamental quantum mechanics - are only very indirectly and loosely connected with physical factuality. They are quasi exclusively dominated by abstract consensus-generating constraints of logico-mathematical nature imposed upon only the modalities of *observation*. The formal features as well as the large variety of observational constructs entailed by this sort of constraints manifest a vertiginous growing of the degree of conceptual freedom displayed by modern physicists in the representations of physical reality. (The non physicists cannot exert a professional control of this freedom which involves danger for them to skid into mere relativism). In these alternative methods for constructing inter-subjective consensuses, specific of the relativistic approaches, one can again identify forms of the general tendency, in modern physics, to merge with epistemology and philosophy.

In short, this work brings into evidence that in modern physics objectivity means constructed inter-subjective consensus founded on descriptional relativizations of various sorts that fall apart in two main classes, radically different from one another but both pointing toward an underlying stream toward unification of physics with epistemology and philosophy. This stream crystallizes the method of relativized conceptualization that is the core of this work.

II. PRELIMINARY PERSPECTIVE
"Existants" or "Reality", and Objectivity

The existence, for each human being, of an inner psychical reality, probably has never been doubted by any normal person. Following Descartes, Berkeley, Kant, Husserl, the philosophers

place it explicitly at the bottom of any knowledge. Physicists have never denied it. Nor did common sense. And nevertheless - paradoxically - for most people the quintessence of what is called reality, of what is hold to be "genuinely" existent, is the *exterior PHYSICAL* reality, even if this or that marginal individual happens to perceive the exterior physical reality as less certain than his own inner reality, or even - at the solipsistic limit - as wholly illusive.

This entangled hierarchy has multiple manifestations. For instance, it is striking that concepts, and more generally knowledge, languages, science, are seldom explicitly taken into account as constituents of the real, strictly speaking. It is true that Teilhard de Chardin did so (this is his major specificity) ; that Karl Popper [2] asserted "three worlds", the physical reality, the states of consciousness, *and* knowledge, arts, cultural facts ; and that no doubt other important examples can be found. But on the other hand, up to this day, the debate on the existents (do the unicorns exist ?) still continues among logicians [3], Platonism has adepts as well as well as enemies, etc. And, more or less implicitly, a general tendency can be observed to *set aside* the word reality for designating exclusively what is posited to exist outside any psychism, and moreover is physical. A larval form of this tendency is present in particular in the reductionist view according to which anything which at a first sight seems not to consist of exclusively physical entities, in fact is strictly deducible *without any loss* from the existence and laws of the physical reality *alone*. This view - favored by a loose contact between philosophers and scientists - is still quite active in many eminent minds, notwithstanding that most philosophers perceived it as naïve and illusive already since Descartes, while since Kant they almost unanimously banished it explicitly and radically.

On the other hand Einstein relativity and then - otherwise - quantum mechanics, induced a stream of change into the content assigned in physics to what is called truth and objectivity. The main contribution to this stream consists of deliberate constructions of symmetries concerning the processes of qualification of the considered object-entities, symmetries tied with groups of operations of transformation of the state of observation. But furthermore other modern developments of the "exact" thinking, logical, mathematical, informatical, also contribute, by direct elaborations of grammars (syntaxes) admitting of models (interpretations), by the association between categories of (abstract) "objects" and morphisms preserving invariants of these, by algorithms for reconstructing phenomena by simulation instead of representing them by assertions and proofs, etc. Now, all these new approaches are methods for constructing iner-subjective consensus concerning results of manners of conducting descriptional actions in order to reach a definite *aim* of knowledge. They all involve an explicit teleological dimension where factors of various natures - psychical or physical, interior or exterior, factual or abstract-conceptual -

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[2] Popper K.R. and Eccles J.C., (1977), *The Self and its Brain* , Springer.
[3] *Non-Existence and Predication*, (1985), Rudolf Haller Ed.

cooperate inside an organic whole. This amounts to an implicit deletion of the classical belief that consensus manifests a pre-existing objective truth which has to be discovered.

This evolution induces the scientific thinkers into redescovering by themselves certain basic features of Kant's constructivist view on objectivity [4]. This generates among those who work in the foundations of science, an increased receptivity with respect to the philosophical thinking sedimented since millennia. While on the other hand the philosophers tend more and more to concentrate upon the methods and languages that emerge inside the sciences, trying to bring forth the new philosophical implications of these.

Globally, philosophy and the sciences are meeting in a process of re-elaboration of the concepts of reality and objectivity. I shall now go to the bottom of this process. I shall focus upon the content of the very *first* layer of the emergence of the inter-subjectively known.

Knowledge and *Communicability*

Kant stated explicitly that exclusively phenomena are *directly* known. In this context the word phenomenon designates a conscious *psychical* event from an *individual* interior universe. This event can be conceived by the man who experiences it as reflecting - or not - some object-entity ; but in *any* case, a close examination leads to the conclusion that it somehow bears the mark of the body-and-mind structure of that man, in a non removable and inextricable way. This is the foundation of the well-known Kantian postulate of impossibility to know reality such-as-it-is-in-itself, i.e. *independently* of any structure interposed by an observer-conceptor.

It is curious to note that this famous impossibility concerns exclusively the *exterior* reality. In Kant's formulations the word reality means exterior reality. For if one chooses to point *via* this same word, toward any sort of existent, no matter whether assigned to the exterior universe or to some interior universe, then this extension generates one - huge - *exception* to Kant's postulate. Indeed this extension entails that also a phenomenon is an element of reality. But on the other hand a phenomenon in Kant's sense - by definition - *is* what *appears* to the mind where it emerges. So for the sake of self-consistency a phenomenon in this sense has to be posited to be known by the mind where it emerges *precisely* such-as-it-is-in-itself. To assert the contrary would simply be a logical contradiction. Later this phenomenon, if it is globally taken as an object-entity, might be perceived differently, or explained, or if it is communicated to another mind its description might there be variously interpreted, psychoanalytically, medically, etc. But in all such cases one is in fact speaking of *another* (meta)phenomenon that is related with the initial one but is not identifiable with it. And this new (meta)phenomenon, in its turn, again must be posited to be known by the mind

[4] Petitot J., in *Debate with Jean Petitot on Mathematical Physics and a Formalized Epistemology*, in *From Quantum Mechanics Toward a Formalized Epistemology*, Mugur-Schächter M. and Van Der Merwe A., Eds., Kluwer Academic Press, to be published.

where it emerges, such-as-it-is-in-itself, etc. This sort of limiting idempotence however is not in the least a "problem". On the contrary it seems to be in deep harmony with the Cartesian cut. Indeed this idempotence can be considered to mark a polarity of reality with respect to knowledge, by which, while the exterior reality *never* can be known such-as-it-is-in-itself, any piece of interior reality - at the time when it emerges in this or that individual mind - can *only* be known by that mind such-as-it-is-in-itself, whereby its truth is beyond any doubt, so is endowed with the Cartesian sort of preeminence.

But let us come back to the fact that a phenomenon, by definition, can only exist inside an individual mind.

At the time when a given phenomenon emerges in an individual mind, it is known there without being also communicated. The subject can even know it without having *ex*-pressed it for himself : a phenomenon can remain an unexpressed, a-symbolic individual psychical fact, chained to, and somehow mixed with the interior universe where it happened. On the other hand, according to the Kantian view any scientific objectivity is *constructed* by a method of "legalization" of phenomena. Jean Petitot (ref. 4) writes :

> «*The object of experiment, of scientific knowledge, is not given in the donation of the phenomenon*. It emerges by objectual legalization of phenomena. So, apart from a descriptive dimension, any scientific knowledge presupposes in its very principle also a *prescriptive*, a normative dimension, that is *constitutive of objectivity*.....In Kant's work - so concerning classical mechanics - *the method consists essentially in interpreting the categories of objectivity'* [5] by starting from the instances of donation of the phenomena, that is, by starting from the forms of phenomenal manifestation. Since the interpretation of the categories of objectivity is operational only if it is *mathematical*, the forms of phenomenal manifestation themselves must be mathematized.»

But such a legalization involves communicability. So how is the transposition of phenomena into communicable symbolizations set up ? Here, at precisely this point, the Kantian view contains an obscure zone where is located - undefined - the structure of the very first stage of *inter* - subjective conceptualization, that on which the whole subsequent inter-subjective conceptualization is founded, so also objectivity in general and in particular scientific objectivity. The Kantian postulate requires an explicit specification which - in so far that one agrees that any transposition of a phenomenon in communicable terms amounts to a description - admits of the following formulation :

> *NOTHING else but DESCRIPTIONS can be known in an inter-subjective way, neither exterior factual entities "themselves", nor non-described phenomena*.

[5] The "dynamical" (physical) categories of substance, of causality and of interaction, and the "modal" categories of possibility (potentiality, virtuality), of reality (actuality) et of necessity.

This specification is far from being trivial : it focalizes the attention upon the importance of communicability. Communicability in general as a larger basis for the particular sort of communicability that is normed scientifically. By way of consequence it establishes the interest of defining a *canonical* structure for what is called a description, a normed form of the descriptions, a mould into which to pour in an agreed way any transposition of a phenomenon, in communicable terms. In short, it establishes the interest, *before* entering upon the question of a scientific legalization of phenomena, of first legalizing the processes of description. Indeed, if a conveniently structured general norm for accomplishing descriptions were available, this norm would act as a universal reference with respect to which any description could be gauged, the natural descriptions as well as, in particular, the various procedures for a scientific legalization of the descriptions of phenomena. These procedures could then be qualified, compared, understood, inside a common frame where a certain unity is set in advance beneath the specificities tied to this or that scientific approach.

But how, according to which criteria, shall we identify the canonical form to be required for any description ?

It is quite remarkable that the answer to a question of such generality can be drawn from a physical theory. For it is quantum mechanics which shows the way, if the descriptional aim chosen in it, and the strategy practiced in order to reach this aim, are thoroughly explicated.

III. THE QUANTUM MECHANICAL DESCRIPTIONS AND THEIR TYPE OF OBJECTIVITY

The content of this brief chapter is a very simplifying summary of much more elaborate expositions published elsewhere [6,7,8,9,10].

A description involves a definite object-entity and qualifications of it. The basic object-entities of quantum mechanics are what is called states of microsystems. These are *hypothetical* entities that no human being will ever perceive. The obtention, for them, of stable qualifications, raises difficult and deep questions. Nevertheless quantum mechanics exhibits a very performing description of the states of microsystems. This is the result of a very elaborate descriptional strategy throughout which each element involved has been entirely and explicitly *constructed* -

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[6] Mugur-Schächter M., (1991) *Spacetime Quantum Probabilities I* :....., Founds. of Phys., Vol. 21.
[7] Mugur-Schächter M., (1992), *Toward a Factually Induced Space-Time Quantum Logic*, Founds. of Phys., Vol. 22.
[8] Mugur-Schächter M., (1993) *From Quantum Mechanics to Universal Structure of Conceptualization and Feedback on Quantum Mechanics*, Founds. of Phys., Vol. 23.
[9] Mugur-Schächter M., (1997) *Les leçons de la mécanique quantique (vers une épistémologie formelle*, Le Débat No. 94, Gallimard.
[10] Mugur-Schächter M., (1997) *Mécanique quantique, réel et sens* in "Physique et réalité, un débat avec Bernard d'Espagnat", Éditions Frontières.

factually as well as conceptually - while step by step expressions of the constraints that weighed upon the progression were integrated into the construction. In what follows I bring into evidence telegraphically only those features of this descriptional strategy which are immediately related with the aim to norm the concept of description.

Let us consider first the basic object-entities of the quantum mechanical descriptions, states of microsystems (micro-states). Since they cannot be perceived, such object-entities cannot be made available for study by just selecting them inside some ensemble of preexisting entities. Nor can one study them by just examining observable marks spontaneously produced on macroscopic devices by admittedly pre-existent natural micro-states : no criteria would then exist for deciding which mark is to be assigned to which micro-state. The *unique* fully satisfactory solution, then, is to *first* accomplish a known and repeatable macroscopic operation posited to generate an *unknown* micro-state, and to try *afterward* to somehow manage to "know" the generated micro-state.

Furthermore one has to posit by definition that *what* will be called "the generated micro-state" will be treated as being stably the *same* each time that the specified operation of state-generation is repeated, no matter what characteristics the observable manifestations subsequently drawn from it will reveal : a given operation of state-generation corresponds to one given micro-state. This is just a *METHODOLOGICAL choice* (refs. 9,10).

Consider now the micro-state produced by a given operation of state-generation. The plan is to acquire concerning it informations of various pre-established sorts, involving what is called "position", or "momentum", or "energy", etc. The grids for the desired sorts of qualification are conceived beforehand, quite independently of the generated object-micro-state, and with respect to *these* grids the object-micro-state emerges in general still entirely unknown, still strictly non-qualified. This assertion is not in the least weakened by the fact that the presuppositions of the existence of micro-states, and of the emergence of a given micro-state when a given operation of state-generation is realized, insert already the generated micro-state into a net of - hypothetical - pre-conceptualization : the generated micro-state emerges NON-PERCEPTIBLE, so *a fortiori* entirely un-known from the specific points of view expressed by the definitions of its desired qualificators. But on the other hand it emerges also unremovably *relative* to the employed operation of state-generation, and this - on the basis of the posited one-to-one relation specified above - permits to *label* it : it is the stable result of *this* - known - operation of state-generation. Let us materialize this possibility. Let us symbolize by ms the generated micro-state and by G_{ms} the corresponding operation of state-generation. Though in this incipient stage the symbols ms and G_{ms} are *devoid of any mathematical representation*, their introduction is very important. Indeed it instates the fact that the generated micro-state, though unknown, is nevertheless *captured*, in this sense that one can now produce as many copies of it as necessary and subject each copy to some subsequent operation of examination, while communicating clearly what one does, by words and

signs. This amounts to having achieved a sort of *a-conceptual definition* of an *infinite* set of replicas of the object-entity called a micro-state and symbolized ms. A purely factual and nevertheless communicable definition. Thereby one of the extremities of the chain of information that was to be started, is now fixed.

Once the first stage, of production of an object-entity, has thus been achieved, one can enter upon the second stage, of construction of a certain knowledge concerning the generated object-entity. The object-entity denoted ms, such as it emerges from the operation that generates it, in general does not reach the level of what is observable by man. So it has now to be *brought* to trigger on this level some observable manifestations. Furthermore these manifestations have to be endowed with significance, namely with precisely the researched kind of qualifying significance. In order to reach this new aim, *measurement interactions* M(X) with macroscopic measurement devices are organized for measuring the *quantum mechanical dynamical quantities* X (X runs over the set of dynamical quantities that are mathematically defined inside quantum mechanics ; M(X) designates the process by which X is measured). The formal representations of these interactions are mainly conceived in a peculiar sort of prolongation of the classical mechanics. Thereby - implicitly - history and *models* come in (refs. 9,10). The practical realizations of the measurement interactions M(X) are planned such as to produce perceptible marks $?_X$ upon a convenient *X-measurement device*. Each such mark, once produced, is interpreted - accordingly to an explicit rule of calculus determined by the formal definition of X and by the specification of the interaction chosen as a measurement process M(X) - in terms of an *eigenvalue* X_j of the quantum mechanical dynamical quantity X (j is a discrete or continuous index). In this way, by a complex interplay of inherited pre-conceptualizations, implicit models, macroscopic operations, theoretical representations, and calculi, are achieved the basic quantum mechanical qualifications.

But qualifications *of what*, exactly ? For one has to admit that in general a measurement interaction *changes* quite radically the micro-state initially created by the employed operation of state-generation, so the observable marks emerge indelibly *relative* to the measurement process. Which means that they characterize globally the measurement interaction, not the object-micro-state separately. One can however cling to the fact that the observable marks are *also* relative to the initially created micro-state, while the type of change undergone by this micro-state during a measurement interaction is ruled in an admittedly known way by the structure assigned to what is called a measurement process M(X). One has then to take into account that two distinct processes of change corresponding to two distinct measurement interactions M(X) and M(X') of two different quantum mechanical dynamical quantities X and X'?X, in general *cover two different space-time domains*. Therefore they cannot be both simultaneously achieved starting from *one* single replica of the micro-state ms : in *this* sense these two measurement interactions are mutually incompatible. So, if one wants to obtain qualifications of the micro-state ms, in terms of both X and X', one has in

general to generate *more* than only one replica of ms. In fact a full study of ms involves *a big number of replicas of PAIRS* **[**(a given operation G_{ms} of state generation),(a measurement process M(X))**]**, the chronometer being re-set at the same initial time-value t_0 for the realization of each pair refs. 9,10). By a very big number of repetitions of pairs **[**(a given operation G_{ms} of state generation),(a measurement process M(X))**]** where X runs over the set of all the dynamical quantities defined inside quantum mechanics, are obtained classes $\{X_j\}$ of registered marks that are mutually incompatible in the sense specified above, and the set of all these classes admits of the following unifying *minimal model* :

> One succeeds to specify the *probabilities* of what can be conceived to be the *POTENTIALITIES* of observable manifestations X_j which a micro-state ms that is *relative* to a given operation G_{ms} of state-generation "possess" *relatively* to this or to that quantum mechanical X-measurement process M(X).

So the concept of *relative POTENTIALITIES* of observable manifestations, permits to found upon the observable marks $?_X$ obtained by measurement interactions M(X), a *standard* way of speaking of the micro-state ms itself. Namely it permits to speak of the micro-state ms - relative to G_{ms} - in terms of "properties" that are "possessed" by *it* alone, before the changes undergone during the measurement interactions which led to marks $?_X$ characterizing these interactions. But - mind that - what is achieved in this way is not more than just a *model* that should by no means be confused for an - impossible - specification of how-ms-really-is-in-itself. A very remote sort of minimal model indeed, because of the double relativization and of the potential character of the assigned properties. But nevertheles a model that insures a standard way of speaking. Which is a precious support for thinking.

The space-time incompatibilities between different measurement interactions M(X) achieved on the micro-state ms generated by a given operation of state-generation G_{ms} entail - in terms of the minimal model specified above - that :

> The set of all the physical processes of *actualization* of the various relative potentialities of observable manifestations assigned to a micro-state ms tied with a given definition of an operation of state-generation G_{ms} falls apart into a set of mutually incompatible classes of actualization. This brings forth *a probabilistic whole of a new type involving triadic chains with potential-actualization-actualized links, and a global tree-like space-time structure*.

I called this structure *the quantum mechanical probability tree of the operation G_{ms}* (refs. 6 to 10, and 14). By reference to the quantum mechanical probability trees, the quantum mechanical

formalism can be understood clearly and in full detail, and furthermore it can also be improved, thus yielding what I call *meta-quantum-mechanics* (ref. 14).

This is the essence of the quantum mechanical descriptions.

What sort of *objectivity* do such descriptions insure ? The knowledge constructed by the quantum mechanical descriptions *is* endowed with objectivity in the following sense.

> All the physicists who, while being at rest with respect to one another, apply the quantum mechanical prescriptions for obtaining observable results concerning a given pair **[**G_{ms},M(X)**]** obtain the *same* probabilistic distributions p(ms,X_j) of the results no matter what is the space-time location of their acts of investigation. So the quantum mechanical distributions of probabilities p(ms,X_j) are *invariants* with respect to changes of the space-time coordinates. The quantum mechanical distributions of probabilities p(ms,X_j) are physical "laws" associated with the considered pair **[**G_{ms},M(X)**]**, that is, pieces of inter-subjective consensus involving physical operations and facts, a consensus insured inside a large class of observer-conceptors.

It appeared above that the quantum mechanical descriptions are the result of a deliberate *construction* of communicable knowledge, founded on the systematic *relativization* to *pairs* of operations **[**(a given operation G_{ms} of state generation),(a measurement process M(X))**]** (in short **[**G_{ms},M(X)**]**). So, in order to achieve a quantum mechanical descriptions of a micro-state it has been necessary :

(a) to achieve the epistemic action denoted G_{ms} that introduces the object-entity, *independently* (in general) of any epistemic action by which this object-entity could be qualified ;

(b) to achieve the epistemic actions that lead to qualifications of the object-entity ;

(c) to realize both these distinct sorts of epistemic actions in a radically *creative* way, by first *generating* - physically, in space-time - an object-entity that did not pre-exist, instead of just *choosing* it among already available physical objects, and by then *generating* - physically - also observable manifestations of the previously generated object-entity, instead of just *detecting* pre-existing properties possessed by this entity ;

(d) to realize a big number of replicas of the pair **[**G_{ms},M(X)**]** for each quantum mechanical dynamical quantitiy X (at least for two in fact).

(I do not mention in this enumeration the search for a standard way of speaking and thinking of this structure of operations and observable results, because many physicists still consider this not to be a necessity)

Now, this is a maximally *displayed* and *creative* way of achieving descriptions, where all the involved relativities are explicit. It is crucial to realize clearly that such a degree of display

and creativity is *absent* in most of our current "classical" conceptualizations such as they are reflected by the natural languages as well as by logic, probabilities, physical theories, Einstein relativity included. In the classical conceptualizations it has always been possible to suppose more or less implicitly that the considered object-entities *pre-exist* to the descriptional process, that they are "defined" in advance by properties which they possess already *actualized*, and *independently* of any act of examination. As long as the peculiar aim of describing states of microsytems had not yet been conceived this supposition never lead to noticed difficulties. Therefore classically a description is conceived to consist exclusively in the detection of one or more among the actual properties of the pre-existing object-entity. The very question of how the object-entity is introduced is entirely skipped. As for the dynamical evolution that creates a known qualification, it is shrinked into one static act of mere detection. This last classical contraction - with respect to the quantum mechanical scheme - is the source of the most striking explicitly known differences between quantum logic and probabilities, and classical logic and probabilities (ref. 7).

It is however noteworthy that, while in classical logic and classical probabilities - the two most fundamental classical syntaxical structures - the quantum mechanical descriptional scheme is inapparent, this scheme nevertheless is explicitly involved in many quite current epistemic situations and procedures. Indeed, once one has clearly perceived the peculiar and very difficult epistemic situation dealt with in quantum mechanics, and the descriptional strategy that permitted to dominate it, by a variation that reminds of those which make appear certain drawings of a cube as sometimes convex and sometimes concave, a very paradoxical inversion arises. What first, in the quantum mechanical approach, had seemed to be fundamentally new and surprising, suddenly appears on the contrary as endowed with a certain sort of universality, so of normality. It leaps to one's mind that :

- any self-contained and explicit account of a process of description must include a *full* specification of the action by which the object-entity is introduced, as well as a specification of the action by which a qualification is obtained for this object-entity ;
- often these two actions are mutually independent ;
- the introduction of the object-entity is sometimes achieved by *creation* of this entity, while the operation of qualification always changes the object-entity, and sometimes radically, in which cases the relativizing consequences of one or the other or both these epistemic actions, upon the development of the process of description, have to be explicitly taken into account and thoroughly analyzed.

For instance, think of a detective who is searching for material indications concerning a crime. What does he do ? He usually focuses his attention on a convenient place from the physical reality, say the theater of the crime, and there he first operates extractions of some samples (he cuts out fragments of cloth, detaches a clot of coagulated blood) ; or he might entirely create a test-

situation involving the suspects, and insure registration of their behaviors by hidden apparatuses, etc. Afterwards he insures examination of the samples or of the behaviors registered during the test-situation. One can equally think of a biopsy for a medical diagnosis, or an extraction of samples of rock operated by a robot on the surface of another planet, and the subsequent examinations. In all these cases the observer-conceptor more or less radically *generates* an object-entity that did not pre-exist in the desired state, in order to qualify it later by operations that are quite independent of the operation which generated these entities. And in certain cases the operation of examination so radically changes the object-entity, that, if several different examinations are necessary, also several replicas of the object-entity are necessary. Furthermore, the obtained qualifications arise indelibly marked by a double relativity : relativity to the way of generating the object-entity (for instance this way can simply exclude certain subsequent examinations), and also a relativity to the sort of examination that was achieved.

The preceding considerations call forth the following two correlated remarks.

In the first place, the nature and realm assigned by classical thinking to communicable knowledge, are misleading and shrinked. The whole zone where mind *actively CONSTRUCTS*, out of pure factuality, the very *first* forms of communicable knowledge, is so deep-set that it remained hidden *beneath* the basic building blocks of current occidental languages. These - subjects-and-predicates - suggest available, pre-existing data. Furthermore the primordial creative zone remained *cut out* from also most of the *a posteriori*"general" and "basic" scientific representations. Notwithstanding the well known analyses of Poincaré, Einstein, Piaget, and many others, not only logic and probabilities, but also the set theory (hence most domains of modern mathematics), modern linguistic and semiotic, etc., take their *start* from a level organized *above* language. And factuality - *via* language - is supposed to spontaneously imprint, upon *passively receptive* minds, already existing properties of already existing objects. The active role is assigned quasi exclusively to the exterior factuality, not to the mind. This attitude, in fact, is stronger and more general concerning object-entities than concerning qualifications. But globally, as far as I know, an attempt at an integrated and systematic representation of the *emergence* of individual object-entities and of qualifications of these, is still lacking. The cognitive sciences are trying to initiate a representation where the sensorial bio-psychical processes play the main part. But it is quantum mechanics which, for the first time, suggests the possibility of such an attempt founded on descriptional aims, physical operations and devices, and concepts.

In the second place the descriptional scheme explicated from the epistemic strategy of quantum mechanics is paradigmatic. It has included a certain sort of universality. Quantum mechanics involves a particular materialization of an extreme epistemic situation, namely that which is realized when a communicable conceptualization is researched concerning non pre-existing physical entities that are only conceived of *a priori*. and which, if generated, in general

emerge in not perceivable states. In such extreme circumstances one has been compelled to a radically active, constructive attitude, associated with a maximal decomposition of the global process. *All* the stages of the desired description had to be *built* out of pure physical factuality, independently of one another, each one in full depth and extension : the severity of the constraints revealed *the most complete and explicit descriptional scheme* where *any* other more particular description must find lodging. In this sense the quantum mechanical descriptional scheme possesses a universal value.

As soon as this universal value has been understood, one finds oneself in possession of a starting point for specifying a convenient canonical form of any description. Indeed a canonical form must be precisely a complete abstract structure with a maximally carved out capacity. It must be a form, a mould, able to offer an available, specific, and sufficiently large location, for any possible stage of any possible descriptional process. In this or that given description, one or more locations offered by this canonical form might remain partially or totally non utilized. But then this will be *known* since the form will exhibit *a labeled void of estimated ampleness*. For instance, if I say «I consider what I see just in front of my eyes and this is a red surface», by reference to the maximally complete mould drawn from quantum mechanics it will appear that in this case the two canonically distinct descriptional actions, of generation of the object-entity, and of qualification of this entity, have coalesced in the unique act of looking just in front of my eyes, which *both* delimits and qualifies the object-entity. So the location reserved for the stage of independent generation of an object-entity remains entirely void in this case. It will also be possible to estimate the magnitude of only partial voids and to draw consequences. For instance, imagine the assertion «I plucked this flower, I examined its morphology with a microscope, and the result is this». Comparison with the canonical mould brings forth that this amounts to a description where the object-entity is introduced by an only partially creative action - plucking a flower -, while the act of examination might only very little change the initially introduced object-entity. So in this case the two maximal places reserved in the canonical mould in view of a possibly radical creativity in both the stage of production of an object-entity and in that of qualification of it, remain nearly entirely unused. It follows that a classical treatment (assuming the pre-existence of the object-entity as well as its invariance with respect to the process of qualification) can be posited to produce a very good approximation to the result that would be obtained by a complete canonical treatment.

IV. NORMS FOR DESCRIBING : THE METHOD OF RELATIVIZED CONCEPTUALIZATION

Since 1982 I never ceased developing *a method of relativized conceptualization* (MRC) [11,12,13,14] (and also ref. 8) founded on the generalization of the descriptional scheme which I explicated from the quantum mechanical descriptions. In what follows I expose only the nucleus of this method. But, at least in certain respects, the exposition of this nucleus is here more detailed and perhaps clearer than everywhere else. Furthermore, in all the preceding publications I made use from the start on of certain ideographic symbolizations but I never tried to achieve a mathematical formalization. Whereas in this work I give first an exposition in usual language and then I sketch out a formalization in the terms of the theory of categories. But the most important novelty submitted in this work is probably the explicit definition of a concept which in all the previous expositions remained diffuse, namely the concept of *genset* which, I think, contains the germ of a deep unification between mathematics and logic. While inside MRC as a whole certain essences drawn from modern physics merge with the Kantian view on realism, define it more, and root it deeper : physics and philosophy generate a new unity.

The nucleus of MRC

MRC can be regarded as an attempt at a "legalization" of the processes of description of any sort, or in other terms as a certain normation of the processes of *communicable* conceptualization. In what follows I give an account of only the main features of this attempt. More detailed accounts can be found in the refs. 12, 14).

I proceed in three stages. In a first stage, in order to offer a preliminary intuitive understanding, I give a presentation that makes use of exclusively the current language and abbreviating literal notations of words. The second stage contains a summary of the ideographic symbolization utilized in all the previous expositions of MRC (which permits a more suggestive and economic expression of certain basic concepts and assertions, but on the other hand has been felt by some collegues to obscure the initial process of intuitive understanding and to restrict the freedom of an attempt toward a mathematical formalization). In a third stage I indicate the first steps toward a mathematical formalization of MRC in terms of the theory of categories.

The first stage : a presentation of MRC in usual language

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[11] Mugur-Schächter M., (1984) *Esquisse d'une représentation générale et formalisée des descriptions et le statut descriptionnel de la mécanique quantique*, Institut de la Méthode, Lausanne.

[12] Mugur-Schächter M., (1992) *Spacetime Quantum Probabilities I I :.....*, Founds. of Phys., Vol. 22.

[13] Mugur-Schächter M., (1995), *Une méthode de conceptualisation relativisée*....., Revue Int. de Systémique, Vol. 9, No 2.

[14] Mugur-Schächter M., *Meta-Quantum-Mechanics and a Method of Relativized Conceptualization*, in *From Quantum Mechanics Toward a Formalized Epistemology*, Mugur-Schächter M. and Van Der Merwe A., Eds., Kluwer Academic Press, to be published.

In what follows I formulate definitions (D), a postulate (P), principles (P), a convention (C), and assertions called propositions (?) because they are obtained by "natural deduction". Each step is labeled by the symbol of its nature - D, P, P, C, or ? - followed by the ordinal of the step. There are 19 steps. When a step is splitted in sub-steps a sub-ordinal is added for each sub-step.

I proceed by enumeration.

D1. ***Consciousness functioning***. The activity of an observer-conceptor's mind - called here *consciousness functioning* and noted CF - is conceived to play a central generative role, acting on the exterior universe *and* on the interior universe where it belongs, and there, in particular, also on itself. This activity is regarded as the quintessence of the epistemic *actor*, irrepressibly anterior and exterior to any specified epistemic action. *It is an (the ?) invariant among all the epistemic actions of which the observer-conceptor is aware*. It is conceived to transcend any stable separation between itself and its exterior where it constantly pours out any new product. It marks a mobile, permanent and non removable cut - a ultimate cut - between itself and the rest.

The Cartesian cut between *res cogitans* and *res extensa* is second with respect to this mobile cut.

Throughout what follows CF is explicitly incorporated in the representation. Thereby this approach breaks openly and radically with the classical concept of objectivity. It introduces basically, in a declared and systematic way, the supplementary representational volume that is necessary for a non-amputated expression of the new concept of objectivity in the sense of an inter-subjective consensus, such as it emerged from modern physics, from quantum mechanics and Einsteinian relativity. That is, an inter-subjective consensus founded on systematically extracted fragments of pure factuality (quantum mechanics) and qualified by qualificators explicitly constructed in order to express definite classes of relative observational invariance. Indeed both these constraints, that are the core of modern physics, involve CF in a quite essential way.

D2. ***Reality***. What is called reality is posited here to designate the *evolving* pool - always considered such as it is available at the considered time - out of which any given consciousness functioning either radically creates, or delimits, or only selects, object-entities of *any* kind whatever, physical or psychical or of a mixed kind. This pool will be indicated by the letter R.

This non restricted definition of "reality" refuses the disputes on "non-existants" (do unicorns exist ? does the number 3 exist ? etc.).

P3. ***The realist postulate***. Throughout what follows is explicitly postulated the *existence* - independently of any mind and of any act of observation - of also a *physical* reality.

P3 might seem to be entailed by D2, but in fact it is not. Indeed, though everybody agrees that what is called physical reality does contribute to the pool out of which the CF's extract object-entities to be studied, the various disputes concerning "existence" of this or that sort of object-entity (does Jupiter

exist ?) nevertheless continue. The association [D2+P3] is intended as ***(a)*** a *memento* of the fact stressed most by Descartes and Kant and recognized by the majority of the philosophers, that the assertion of the existence of physical reality *cannot* be considered to be *primary* - in the order of the emergence of knowledge - with respect to the assertion of the existence of the subjective psychical universes (as classical physics might seem to suggest) : the word «also» in the formulation of P3 is intended to provocatively remind of this ; ***(b)*** an explicit refusal of solipsism, on the other hand ; ***(c)*** an inclusion in what is called reality, of the concepts and systems of concepts, of the behaviours, beliefs, etc. (the third world of Popper).

D4. ***Generator of object-entity and object-entity.*** The epistemic operation by which a consciousness functioning introduces an object-entity will be regarded as an action upon R achieved by CF by the use of a *generator of object-entity* denoted G. The spot (or zone or the sort of domain) from R where a given generator G acts upon R is considered to be an essential element from the definition of that G, that has to be explicitly specified ; it will be denoted R_G. The object-entity introduced by a given generator G will be denoted $œ_G$. A *one-to-one* relation is posited between a given definition of a generator G and the corresponding object-entity $œ_G$: *that* which emerges as the product of a G-operation is called "$œ_G$".

Any description involves an object-entity. Usually it is considered that it suffices to name or to label this object-entity thus just directing the attention upon it before it is more thoroughly examined. This attitude is *restrictive* since not any conceivable object-entity pre-exists available for examination. Therefore throughout what follows it is required that the basic epistemic action accomplished upon R which brings into play the considered object-entity - no matter whether this action is trivial or not - shall always be indicated explicitly and fully. A generator G of object-entity can consist of *any* psycho-physical way of producing out of R an object for future examinations. Such a way involves systematically some psychical-conceptual component, but which can combine with concrete operations. G can just *select* a pre-existing object or on the contrary it can radically create a new object. If I point my finger toward a stone I select a physical entity by a psycho-physical selective gesture that acts in a non creative way on a physical zone from R. If I extract from a dictionary the definition of a chair I select by a non creative psycho-physical act, an abstract conceptual entity materialized by symbols in a physical zone from R. If I construct a program for a Turing machine in order to examine the sequences produced by this program, I bring into play a creative, instructional conceptual generator of object-entity that acts on a zone from R containing subjective and inter-subjective knowledge as well as material supports of these. If, in order to study a given state of an electron, I generate it by using some macroscopic device that acts on a place from the physical space of which I suppose that it contains what I call electrons, I delimit a physical object-entity, by a psycho-physical creative action. If now I apply the *same* operation upon a mathematical theory, or upon a place from the physical space where the vibrations of a symphony can be heard but the presence of electrons is improbable, I am making use - by definition - of *another* generator - since it involves *another zone* R_G - and, in consequence of the one-to-one relation posited between G and $œ_G$ - I delimit *another* object-entity (interesting, or not, in general not, and probably non-perceptible). When I define by words a new concept, as I am doing now, in order to later specify its behaviour, I produce a conceptual object-entity by working, by the help of a psycho-conceptual creative generator, upon the spot from R consisting of the reader's mind.

The specification, in the definition of G, of the zone R_G from R where G is supposed to act, *permits of uncontrollable fluctuations concerning what is labeled* $œ_G$. The physical region from R where I act in order to generate a given microstate of an electron, can contain non perceptible and uncontrollably variable fields, etc. ; the reader of these lines can happen to be a 16 years old boy, or a mature intellectual. These fluctuations entail an unavoidable non-previsibility concerning the direct effect labeled $œ_G$ of an operation of generation of object-entity. However one should clearly realize that it

simply is inconceivable to "entirely" immobilize *a priori* the effect denoted $œ_G$: this would require to specify "completely" R_G. But such a requirement is - both - impossible and unnecessary. One simply cannot *start* a process conceived for qualifying later this or that object-entity generated out of R, by specifying (qualifying) R itself everywhere and for any time, and from any view point. While the *a priori* non-determination concerning the effect of the individual operations of generation of an object-entity, is by no means a non transgressable problem or a difficulty. It simply is an unavoidable *constraint* that MRC is obliged to recognize, include and manage. This constraint plays an essential role in the dynamics of conceptualization from MRC. It brings into evidence one of the roots of human conceptualization and it comes out to be intimately tied with a reflexive character of MRC, of maximal *a priori* freedom followed by *a posteriori* controls and restrictions.
Consider now the one-to-one relation posited between a given definition of a G and what is called "the corresponding object-entity $œ_G$". This relation is tied with the *a priori* non-determination involved by R_G. It is important to realize that no other relation could be uphold. Indeed the object-entity labeled $œ_G$ emerges still *non* qualified from the standpoint of the subsequently intended examinations (if not its generation would be unnecessary for *this* aim). It can even emerge still entirely inaccessible to direct knowledge of *any* sort if G is a radically creative operation of generation (as in the case of the micro-state generated by certain quantum mechanical operations of state-generation). In these conditions what we called a one-to-one relation between a given definition of an G and "$œ_G$" obviously *cannot* mean that the still unqualified replicas of $œ_G$ are all "identical" in some inconceivable absolute sense. The one-to-one relation posited between G and $œ_G$ is just notational : it amounts to just a *METHODOLOGICAL pre-organization of the language-and-concepts* chosen in order to be able to form and express a *beginning* of the desired epistemic inquiry. If from the start on we imagined that G might produce sometimes this and sometimes something else, how would we *speak* of what it produces ? We would have to re-label in only *one* way the product entailed by a given definition of G - whatever it be - and thus we would come back to precisely our initial choice of language. In the sequel, each time that some definite consequence of this *a priori* choice of language will appear, we shall deal with it for this definite case. The explicitly methodological character of this strategy is a quite crucial step. It saves premature, void, illusory questions and paradoxes that *CANNOT* be solved *a priori* ; and instead, as it will appear, it insures *a posteriori* clear, fully *relativized* definitions of the qualifications of "identity" and "difference" (see ? 12, ? 13, D14.1, ? 18.1).

D5. ***Qualificators***.

D5.1. ***Aspect-view***. Consider a grid for examination which *via* certain operations of examination performed on an object-entity $œ_G$ can produce qualifications of this entity *if* certain preliminary conditions specified in D7 are fulfilled. Such a grid will be called an *aspect-view* and will be denoted V_g. By definition V_g is structured as follows.

- The qualifications that can be generated by V_g are contained inside a semantical dimension called *the aspect g* and labeled globally by the index g (which can take on any graphic form : another letter, a group of letters, some other sign).
- The qualifications that can be generated by V_g are called *g-qualifications*. The set of all the possible g-qualifications is allowed to be *arbitrarily rich* but it is required to be *finite*, so *discrete*. Each g-qualification is called *a value k of the aspect g*, in short a gk-value, where gk - in one block - functions as only *one* index. The aspect g is conceived to *contain* the corresponding finite set of gk-values, not to identify with it.

- A gk value itself is permitted to be of either a physical or an abstract nature, but it is required to be *directly perceptible* by the involved observer-conceptor, *via* his mind or *via* his biological senses.

- The aspect g is considered to be defined if and only if the specification of its values gk is associated with also the explicit specification of an effectively realizable *modality* - physical, or conceptual (in particular formal), or mixed - for :

***** Accomplishing the examinations - physical, or psychical or conceptual - tied with what is called the aspect g.

***** Expressing the results of these examinations in terms of "values gk of the aspect g" (this might require a complex rule of translation).

Any object, device or algorithm involved by the modality required above, is to be included in the definition of the aspect g.

> *So - in contradistinction to the grammatical or logical predicates - an aspect-view V_g is endowed by definition with a STRUCTURE.*

This structure reflects explicitly all the restrictions to which an *effectively* realizable operation of qualification is subjected. Let us note that an order between the values gk of an aspect g is *not* required but is permitted. The distinction between an aspect g and the set of *all* the gk values contained inside that aspect, takes into account the remarkable psychological *fact* that any set of gk-values, even only *one* such value, as soon as it is "conceptualized" (i.e. as soon as it ceases to be a mere "primeity" in the sense of Peirce), generates in the consciousness a whole semantical *dimension* g (a genus) that exceeds this set and constitutes a ground on which to place it : every gk-value determines a location (a specific difference) on this semantical domain g that grows under it (for instance, if gk labels the interior event toward which the word "red" points, this event, when conceptualized, generates the carrying semantical dimension toward which the word "color" points). We are in presence of a fundamental law of human conceptualization that moulds logic, language, and even metaphysics (the concept of "substance" is the semantical ground on which are located the ways of existing of material systems, etc.). The adopted definition reflects this law, on which it tries to draw the attention of the cognitivistic approaches (what are the corresponding bio-functional substrata ?). Finally let us also note that - by definition - an aspect-view V_g acts like a qualifying *filter* : it cannot yield qualifications different from the corresponding gk-values.

D5.2. ***View***. A grid for examination that consists of a finite but arbitrarily large set of aspect-views, is called a view and is denoted V.

The complexity and the degree of organization of a given view V are determined by the number of aspect-views V_g from V and by the structures of the various sets of gk-values introduced by the various involved aspect-views from V (number of gk-values, "position" (central, extreme) of each set of aspect-values on the corresponding semantical dimension g, existence or not of an order among the gk-values of a fixed aspect g, etc.). In particular a view can reduce to only one aspect-view or even - at the limit - to one aspect-view containing only one gk-value on its semantical dimension g. There is *nothing* absolute in the distinction between an aspect-view and a view : an aspect-view can be transformed in a view by analysis of its aspect in two or more sub-aspects, and *vice-versa* the set of distinct aspects from a view can be synthesized into a unique aspect. This stresses that a view - like a generator of object-entity - is just a construct freely achieved by the acting consciousness-functioning CF in order to attain a definite epistemic aim.

D5.3. ***Physical aspect-view and view***. Consider an aspect-view V_g where the aspect g is physical and requires physical operations of examination of which the results consist of some observable physical effects. Such an aspect-view will be called a *physical aspect-view*. A view containing only physical aspect-views will be called a *physical view*.

D5.4. ***Space-time aspect-views***. One can in particular form a *space-time aspect-view* V_{ET}. Accordingly to Einstein-relativity the double index ET can be considered as *one* aspect-index g=ET where E reminds of the current Euclidian representations and T stands for time. However the partial aspect-indexes E and T can also be considered separately from one another, g=E or g=T. The space-aspect E is associated with space-values or "positions" that can be denoted E**r** (setting a position vector **r** in the role of k) and the time-values can be denoted Tt (setting a time parameter t for k). Indeed though in general the *numerical* estimations indicated by **r** and t are not mutually independent, nothing interdicts to symbolize separately the spatial position-value and the time-value.

Infinitely many space-time views can be constructed (by varying, in the representations, the choice of the origins of space and time, the form and direction of the involved reference-axes, of the units for measuring intervals). Any space-time aspect-view introduces an *ordered* grating of space-time values. This is a specificity with highly important epistemic consequences (refs. 12, 14).

D6. ***Epistemic referential and observer-conceptor***. A pairing (G,V) consisting of a generator G of object-entity and a view V, is called an *epistemic referential*. A consciousness functioning CF that endows itself with a given epistemic referential is called an *observer-conceptor*.

> A pairing (G,V) is permitted to be entirely arbitrary *a priori*. This is a methodological reaction to an unavoidable constraint : the capacity of a pairing (G,V) to generate meaning, can be examined only after having considered that pairing. This is a manifestation of a general reflexive strategy practiced in MRC, of a tentative *a priori* approach that is entirely non restricted, but is followed by *a posteriori* corrective restrictions.
> An observer-conceptor is the minimal epistemic *whole* able to achieve epistemic actions in the sense of MRC: by itself an epistemic referential (G,V) is not yet a closed concept, nor does it designate an active entity. This concept becomes closed and activated only when it is associated with the consciousness functioning CF that generated and adopted it.

D7. *Relative existence and inexistence*. Consider an *a priori* pairing (G,V_g). If an examination by the aspect-view V_g, of the object entity $œ_G$ generated by G, never reveals to the involved observer-conceptor some value gk of the aspect g, we say that *the object-entity $œ_G$ does not exist (is not pertinent) with respect to the aspect-view V_g* (or - equivalently - that *V_g does not exist with respect to $œ_G$* or that *$œ_G$ and V_g do not mutually exist*). (If one

examined with the help of a voltmeter, a symphony by Beethoven, the operation might never produce an estimation of a difference of electrical potential. Of course during a more realistic sort of tentative research a mutual non-pertinence can be much less apparent *a priori* than in this caricatural example).

Suppose now, on the contrary, an act of examination by the aspect-view V_g, of the object entity $œ_G$ generated by G, that *does* reveal to the involved observer-conceptor one or more values gk. In this case we say that *the object-entity $œ_G$ exists with respect to the aspect-view V_g*, (or that *V_g, exists with respect to $œ_G$* or that *V_g, and $œ_G$ do mutually exist*).

> The definitions of relative inexistence or existence can be transposed in an obvious way to one single value gk of an aspect g or to a whole view V.
> The concepts of relative inexistence and existence have quite fundamental consequences with respect to which the classical conceptualizations are more or less blind. Insofar that logic is considered to be specifically tied with the particular qualifications of mutual consistency (formal truth), decidability concerning consistency, and formal completeness, the concepts of relative existence are located *beneath* logic, they concern meaning, not truth, neither factual nor formal truth.
>
> > The concepts of mutual inexistence or existence concern, respectively, the general impossibility or possibility of the emergence of *meaning*, as well as *the intimate connection between meaning and aims*, which induce the tentative pairings (G,V_g) or (G,V).
>
> They express the general fact - previous to any qualification - that a given object-entity can be qualified only *via* the views to the genesis of which it can contribute by yielding matter for abstraction. And they permit to cancel *a posteriori*, among all the initially arbitrary pairings (G,V_g) or (G,V) that an observer-conceptor has tentatively introduced, those which appear to be non-significant, while the other pairings are kept. The possibility of such a selection illustrates the general reflexive strategy of MRC : maximal *a priori* freedom followed by *a posteriori* controls and restrictions.

P8. ***The Frame-Principle***. I posit the following principle, called *frame-principle* and denoted FP.

Consider a *physical* object-entity $œ_G$ that can be (or is conceived to have been) generated by some definite *physical* generator of object-entity, G. This entity $œ_G$ does exist in the sense of D7 with respect to at least one physical aspect-view V_g (D5.3) (if not the assertion of a physical nature of $œ_G$ would be devoid of foundation (content)).

The frame-principle FP asserts the following.

- If the physical object-entity $œ_G$ does exist in the sense of D7 with respect to the physical aspect-view V_g, then *ipso facto* $œ_G$ exists in the sense of D7 with respect to also at least one view V formed by *associating* V_g with a convenient *space-time view V_{ET}* (it cannot exist with respect to *any* such association, if only because the values gk of a given aspect g can appear or disappear with respect to a given space-time view when the space-time units are changed). But the object-entity $œ_G$ is *non*-existent in the sense of D7 with respect to *any* space-time view that acts *isolated* from any other physical aspect-view V_g, g?ET : *the space-time views are FRAME-views which, alone, are blind, they cannot "see" nothing*.

- "Physical space-time" cannot be regarded as a physical object-entity $œ_G$. Indeed the assertion posited in the first part of this principle does *not* apply to what is called "physical space-time" : physical space-time *itself*, considered strictly *ALONE*, is *non*-existent in the sense of D7 with respect to *any* physical aspect-view V_g, and it is equally *non*-existent with respect to any association of a physical aspect-view, with a space-time aspect-view. In *this* sense :

What is called "physical space-time" is only *the container of all the potssible space-time frame-views*.(the "genus" of these).

The frame principle FP adopts, transposes in terms of MRC, and specifies, the Kantian view according to which man is unable to conceive of physical entities outside physical space-time, which he introduces as *a priori* "forms of the intuition" inside which he places all his representations of physical entities.
FP isolates and stresses a particular implication of this view which so far seems to have remained unnoticed. Namely that any mature and normal human being, by the nature of his consciousness functioning, as soon as he perceives or even only imagines a phenomenon which he connects with what he conceives to be a *physical* entity $œ_G$, *ipso facto* introduces **(a)** a space-time frame-aspect-view V_{ET} and *ALSO* **(b)** at least one aspect-view V_g where g is a physical aspect *different from* V_{ET}, relatively to which the considered physical entity $œ_G$ does exist in the sense of D7, and the values gk of which *he combines with the values of the space-time aspect-view* V_{ET} (in mathematized terms, the space-time coordinates yielded by V_{ET}). While by the help of a space-time frame-view *alone*, in the strict absence of any other sort of physical aspect-view V_g (color, texture, whatever) he is unable to perceive or even to imagine a physical entity ; he simply is unable to extract it from the background of only space-time frame-values which, by themselves, act exclusively as elements on *a grid of reference* inserted in the abstract void *container* labeled by the words "physical space-time" ; by themselves they act exclusively as potential land-marks that can be activated only by the values of some other aspect g?ET.
Finally, the assertion that the designatum of the words "physical space-time" cannot be treated itself as a physical (object-)*entity*, probably obvious for most physicists, is introduced here explicitly mainly in order to emphatically block certain very confusing ways of thinking induced in the minds of non-physicists by the verbal expressions by which the physicists use to accompany their relativistic formalizations : these verbal expressions suggest that what is currently called space-time would itself *possess* this or that *metric* ; while in fact any space-time metric is just *assigned* to this or that space-time frame-aspect-*VIEW (referential)*, on the basis of some definite (even if implicit) descriptional *aim* (this is discussed in the last chapter of this work). Such glidings manifest the frequent indifference of present-day physicists with respect to philosophical implications of the ways of speaking.

C9. *Conventions*. In order to take explicitly into account the frame principle FP we introduce the following conventions.

- Any view V considered in order to examine a *physical* object-entity will contain a space-time aspect view V_{ET} and one or more physical aspect-views V_g.

- The aspects denoted g are always *different* from the space-time aspect ET.

P10. ***The Principle of Individual Mutual Exclusion***. Consider a *physical* object-entity $œ_G$ corresponding to a physical generator G. Let V be a *physical* view with respect to which $œ_G$ does exist in the sense of D7, involving two distinct physical aspect-views V_{g1} and V_{g2} aa

well as a space-time view V_{ET} (accordingly to C.9). The *principle of individualizing mutual exclusion* denoted PIME posits the following.

- *Any* physical examination involved by V quite systematically *changes* the state of the examined physical object-entity $œ_G$, even if only to a degree that in this or that context can be neglected : the state of a physical object-entity is is not a stable datum with respect to an act of physical examination (in informatics one would say that it is a "consumable" datum).

- If, when performed separately on *different* replicas of $œ_G$, the examinations involved by V_{g1} and V_{g2} can be shown to cover *different* space-time domains - the referential and the origins for space-time qualifications being kept the same - which involves that they change differently the state of $œ_G$, then it is not possible to perform both these two sorts of examinations simultaneously upon a *UNIQUE* replica of $œ_G$ produced by only *ONE* realization of G.

If the type of impossibility specified above manifests itself, V_{g1} and V_{g2}?V_{g1} are said to be mutually *incompatible*. In the alternative case V_{g2} and V_{g1} are said to be mutually *compatible*.

It is probabably possible to draw P10 *deductively* from a formulation of ultimately basic space-time mutual exclusions (non-reducible to a still more basic ones) (an attempt has been made in ref. 13 p. 290). But here, for simplicity, we start from the formulation P10 because it is more immediately related with the consequences pointed out in the sequel.
The quantum mechanical principle of "complementarity" can be regarded as the realization of PIME for the particular category of physical object-entities consisting of states of microsystems. This brings into clear evidence the often only obscurely perceived fact that complementarity in the sense of quantum mechanics has an *exclusively INDIVIDUAL* significance : indeed two mutually *incompatible* quantum mechanical measurements *can* be simultaneously realized on *two distinct replicas* of a given microstate (object-entity), and if this is done two distinct and useful pieces of information are obtained in a quite compatible way (ref. 7). But this brings already up on a statistical level, and there what is called the mutual incompatibility of two physical aspect-views is not manifest any more. What *is* impossible indeed is only the simultaneous realization upon *one* same replica of the considered microstate, of two mutually incompatible quantum mechanical measurements. The concept of incompatibility of two physical aspect-views is defined only if individuality of the object-entity is assumed.

?**11. *Proposition***. Consider a physical object-entity $œ_G$ corresponding to a generator G and a *physical* view V with respect to which $œ_G$ does exist in the sense of D7. In general, in order to perform upon $œ_G$ *all* the operations of examination corresponding to *all* the different aspect-views V_g from V, it is necessary to realize *a whole set* of *PAIRS* **[**(one operation of G-generation of $œ_G$), (one operation of V_g-examination of that replica of $œ_G$)**]** containing (at least) one such pair for each physical aspect-view V_g from V : indeed, in order to achieve examinations of $œ_G$ *via* mutually incompatible physical aspect-views V_g from V, the operation of G-generation of $œ_G$ has to be *repeated* (the time parameter being re-set to its initial value t_0

(like in sport-measurements, in the repetitions of chemical or physical experiments, etc.)) and paired *successively* with these incompatible aspect-views.

This, though an obvious consequence of P10, is highly *non trivial* by itself. It is important to know explicitly that the achievement of complex examinations of an object-entity involving "consumable" characters in general entails the necessity of reproducible pairs **[**(one operation of G-generation of $œ_G$), (one operation of V_g-examination of that replica of $œ_G$)**]**.

?**12.** ***Proposition***. Consider a *physical* object-entity $œ_G$ corresponding to a given generator G, and one given *physical* aspect-view V_g with respect to which $œ_G$ exists in the sense of D7. When a pair **[**(one operation of G-generation of a replica of $œ_G$), (one operation of V_g-examination of that replica of $œ_G$)**]** is *repeated* (the time parameter being re-set for each pair to its initial value t_0), it is not impossible that the *same* observable gk-space-time-values be found each time. But in *general* this does not happen : in general the obtained gk-space-time-values are *not* all identical, notwithstanding that in each realization of the pair G and V_g obey strictly the same operational specifications.

This follows *per a contrario* : to posit *a priori* that the results produced by repeated realizations of a given pair **[**(one operation of G-generation of $œ_G$), (one operation of V_g-examination of that replica of $œ_G$)**]** are all identical "because" in each pair both G and V_g obey the same specifications, neither follows with necessity from the previously introduced definitions and principles, nor could it be found *a posteriori* to be always *true*. To show this last point it is sufficient to produce a counter-exemple. Consider an object-entity generator G that acts by definition on a zone R_G from R consisting of a piece of land and delimits there the object-entity $œ_G$ consisting of a *definite* area of one square kilometer. Let V_g be an aspect-view (structured accordingly to D5.1 and C9) that permits to establish the aspect g=[association of mean-color-value-and-space-position over a surface - any one - of only one square meter] : inside the epistemic referential (G,V_g), two distinct realizations of the pair **[**(one operation of G-generation of $œ_G$), (one operation of V_g-examination of that replica of $œ_G$)**]** in general yield two *different* results, eventhough both G and V_g satisfy each time to the same operational commands.

It is important to realize now that - quite generally - a generator G of a physical object-entity being fixed (by some operational definition of it), it would even be *INCONCEIVABLE* that for *ANY* association of G with some aspect-view V_g, the results of repetitions of the corresponding pair **[**(one operation of G-generation of a replica of $œ_G$), (one operation of V_g-examination of that replica of $œ_G$)**]** shall all be identical : that would be a *miracle* in so far that *absolute* identity - independent of the considered aspect-view V_g, i.e. for *any* tried aspect-view V_g - has never been observed concerning a *physical* object-entity. As for "identity" in *absence* of *any* view - which, as many do surreptitiously and vaguely imagine, would mean identity of $œ_G$ with *itself* from one realization of G to another one, not of the qualification of $œ_G$ *via* V_g when the specified pair of operations is repeated -, it is but an illusory concept tied with the quest for an impossible "absolute objectivity of the thing-in-itself". (The oppositions stem here from the physical, "exterior" nature supposed for $œ_G$).

This brings us back to the only methodological meaning which - in general - can be assigned to the one-to-one relation posited between G and $œ_G$.

All these assertions, like the preceding proposition ?11, acquire inside MRC quite definite and mutually individualized significances as well as a "deductive" character in the sense of the sort of

"natural" logical construction practiced here (outside any formal system). Which is a quite non-trivial feature of MRC.

?**13.** ***Proposition***. Given an epistemic referential (G,V_g) where both G and V_g involve *physical* operations, in general *no stability* whatever is insured for the gk-space-time values obtained by repeated realizations of the pair **[**(one operation of G-generation of a replica of $œ_G$), (one operation of V_g-examination of that replica of $œ_G$)**]**, neither on the individual level of observation, nor on the statistical one.

Like ?12, ?13 can be justified "rationally" *per a contrario* inside MRC, and furthermore also by drawing attention upon its factual possibility.
If only a maximal, individual stability is considered, i.e. identity of all the groups of observable gk-space-time values corresponding to the various realizations of a pair **[**(one operation of G-generation of a replica of $œ_G$), (one operation of V_g-examination of that replica of $œ_G$)**]**, then ?13 becomes a mere repetition of ?12. But ?13 transgresses ?12 when a stability in the sense of probabilities is considered. Indeed when no individual stability is found, it still remains *a priori* possible that a big number N' of repetitions of a series of a big number N (N'?N in general) of repetitions of the pair **[**(one operation of G-generation of a replica of $œ_G$), (one operation of V_g-examination of that replica of $œ_G$)**]**, shall bring forth a convergence in the sense of the theorem of big numbers, for the relative frequencies of the dispersed triads of gk-space-time-values that have emerged. However - up to some given arbitrary pair of big numbers N,N' - it might appear by experiment that in fact this second possibility does *not* realize *either*, even though G and V_g have been previously found to mutually *exist* in the sense of D7. If this happens we shall decide *a posteriori* that *though G and V_g do mutually exist in the sense of D7, their pairing (G,V_g) has to be "(N, N')-canceled" because it generates no sort whatever of stable meaning* (ref. 12).
This however does by no means exclude the possibility that the same generator G of object-entity, paired with another physical aspect-view V_g'?V_g-, with respect to which $œ_G$ exists in the sense of D7, shall produce qualifications that *are* stable either in the sense of ?12 or in the sense of ?12.

D14. ***Relative description***.

D14.1. ***Relative description of a physical object-entity***. Consider an epistemic referential (G,V) where G is a *physical* generator that generates a corresponding *physical* object-entity $œ_G$, and V is a *physical* view with respect to all the aspect-views V_g of which $œ_G$ does exist in the sense of D7 and which contains a space-time view V_{ET} (as required by P8 and C8) introducing an *ordered* space-time grating (D5.4). Furthermore consider, for *each* V_g from V, a big number of realizations of the corresponding pair **[**(one operation of G-generation of $œ_G$), (one operation of V_g-examination of that replica of $œ_G$)**]**, the time parameter being re-set to its initial value t_0 for each realization of a pair. *Iff* a *stable* result is obtained for each aspect-view V_g from V - either identical outcomes of the corresponding gk-space-time-values, or a probabilistic convergence of the relative frequencies of dispersed triads of such values - then, inside the abstract representation space of V ordered by the space-time grating introduced by V_{ET}, the set of *all* the triads gk-E**r**-Tt (stable in the specified sense) corresponding to *all* the aspect-views V_g from V, constitutes a definite "form" of gk-E**r**-Tt-

values. This "form" will be called a *description of the physical object-entity œ$_G$ with respect to V* and it will be indicated by the notation D$_{t0}$/G,œ$_G$,V/, to be read «the description at t$_0$ relative to the triad G,œ$_G$,V» (when the time-specification is not important, it can be dropped, thus writing D/G,œ$_G$,V/). By definition D/G,œ$_G$,V/ is *the meaning of œ$_G$ relatively to V*.

If the pairs **[**(one operation of G-generation of œ$_G$), (one operation of V$_g$-examination of that replica of œ$_G$)**]** do not produce a stable result for each aspect-view V$_g$ from V, than the pairing (G,V) will be discarded *a posteriri*, notwithstanding that it was found to satisfy the preliminary condition D7 of mutual existence, and we shall say that œ$_G$ does not possess a definite meaning relatively to V.

> This definition is the core of MRC. It finally assignes a significance to what was denoted œ$_G$, a significance which, though it is relative to a vue V, nevertheless is now definite and endowed with communicabilty. While G alone *cannot* systematically insure for "œ$_G$" a significance distinct from just the conventional label «effect of a realization of G» because the results of G might emerge still entirely non perceptible.
> It thus appears that the initial methodological assertion of a one-to-one relation between a given definition of an operation G and its result labeled œ$_G$, does not in the least stay in the way of the assignation of *meaning* to what was labeled œ$_G$. On the contrary, it permits to develop a clear definition of the meaning - or of the absence of meaning - of the result of G *relatively* to any given aspect-view with respect to which this result exists in the sense of D7 (which entails only *possibility* of relative meaning, not also specification of it).

D14.2. ***Relative description of any object-entity***. If in the definition D14.1 the restriction to physical generators and views is suppressed, this definition - indicated by the same notation D/G,œ$_G$,V/ - enlarges in an obvious way to any object-entity œ$_G$, in particular also to a *purely* psychical or conceptual object-entity.

If the considered object-entity is purely psychical (emotion, sensation, concept, desire, idea, etc.) any reference to the frame-aspect of ("physical") space can be dropped, and so the obtained relative description amounts to a "form" of only gk-time values. If moreover it appears that this description can be regarded to be independent also of time values (even of the initial time-value t$_o$) then the reference to the frame-aspect of time can be equally dropped. Then - insofar that the involved g-aspects do not by themselves introduce an order (D5.1) - the obtained description is reduced to just a non-ordered set of gk-values corresponding to the various aspect-views V$_g$ from V. Though inside such a non-ordered set a definite and visualizable *space-time "form"* is absent, the existence of individual or statistical stability required in D14.1 does nevertheless entail, in an abstract representation space, a stable descriptional *structure*.; and usually this structure involves also *correlations*, i.e. a given gk-value is found to be associated with this or that other g'k'-value, g'?g or k'?k or both, always or never (individual correlation) or with this or that relative frequency (statistical correlation).

The dependence on time cannot be dropped, for instance, for the relative description pointed toward by the verbal expression «this theory is true» : the truth-value yielded by the examination of the object-entity consisting of a theory, *via* the aspect-view V_g where g=truth, *does* depend on the structure of knowledge (informations, understanding, modalities of verification, etc.) available to the acting observer-conceptor at the considered time t_o). On the contrary, for the relative description indicated by the verbal expression «the sum of the angles of a Euclidean triangle is 180°», the time dependence can be dropped.
The generalization D14.2 holds in particular concerning any already accomplished *description* selected as a new, *conceptual* object-entity, to be examined in a subsequent description, in a description of the accomplished description. Thereby D14.2 introduces into the sub-realm of *COMMUNICABLE conceptual* reality included in K. Popper's third world. If the considered object-entity is an as yet *non* described psychical fact (emotion, etc.) D14.2 still acts inside the realm of non-communicable psychical factuality, while D14.1 maintained inside the sub-realm of physical reality studied by physics.

D14.3. ***Basic transferred relative descriptions***. In what follows we finally shall touch and transpose in quite explicit and generalized terms, the fundamental epistemological innovation specifically implied by quantum mechanics.

D14.3.1. ***Basic transferred relative descriptions of a physical object-entity***. Consider a relative description where :
- The generator consists of a physical operation and it produces a physical object-entity. Such a generator will be called a *basic generator* and will be denoted $G^{(o)}$.
- The object-entity produced by a basic generator $G^{(o)}$ will be called a *basic object-entity* and denoted $œ^{(o)}$.
- The view able to produce phenomenal manifestations out of a basic object-entity, is necessarily such that the phenomenological content of each gk-value of each involved aspect g, stems from features of a material device for gk-registrations - biological, or not - that is always *different from the studied object-entity*, these features on which the phenomena perceived by the acting consciousness-functioning CF are founded emerging in consequence of interactions between the device and replicas of the considered basic object-entity. Such a view will be called a *basic transfer-view* (in short a basic view) and will be denoted $V^{(o)}$.
- The epistemic referential $(G^{(o)},V^{(o)})$ will be called a *basic epistemic referential*.

A description achieved with a basic generator and a basic transfer-view will be called a *basic transferred relative description* (in short a*basic description* or a *transferred description*) and will be denoted $D^{(o)}/G^{(o)},œ^{(o)},V^{(o)}/$.

Two basic descriptions $D_1^{(o)}$ and $D_2^{(o)}$ achieved with two different and mutually *incompatible* basic aspec-views $V_{g1}^{(o)}$ and $V_{g2}^{(o)}$ but with the *same* basic operation $G^{(o)}$ of object-entity generation, are posited to *characterize* observationally the involved object-entity $œ^{(o)}$ (i.e. it is posited that no other operation $(G^{(o)})'?G^{(o)}$ can be found which,

associated with these same two mutually incompatible basic views, shall produce the same pair ($D_1^{(o)}$, $D_2^{(o)}$) of transferred descriptions). (Of course the same holds for any basic description where the basic view contains at least two mutually incompatible basic aspect-views ; while this might not happen with a basic description $D^{(o)}$ where the basic view $V^{(o)}$ contains no mutually incompatible basic aspect-views).

It is both difficult and crucial to fully grasp the meaning and the importance of the concept of basic transferred relative description. Therefore I shall comment on it in detail, even redundantly.

It is crucial to realize clearly that a physical result produced by a basic physical operation $G^{(o)}$ of object-entity-generation, if furthermore a result of this sort of operation has *never* before been qualified *via* any transfer-view $V^{(o)}$ whatever, "emerges" still *strictly un-known* and even *UN-EXPRESSED*, notwithstanding that the process of generation $G^{(o)}$ *DOES* singularize it out of the whole of reality. Indeed such a result *IS* entirely specified by $G^{(o)}$, it *is* - factually - "defined", since it can be held available for any possible subsequent examination, and it can be deliberately reproduced. More. Factually each such result is *FULLY individualized* by the operation $G^{(o)}$ that produced it, it lies on a level of zero-abstraction, still filled with its whole untouched concrete singularity. Which no language whatever could never do because *we generalize as soon as we speak*, full singularity is unspeakable. But - consequently in fact - this result produced by $G^{(o)}$ alone, not yet followed by an operation of examination, is specified and individualized in a strictly *a-conceptual*, a purely operational way.

It is true that the very definition of the generation-operation $G^{(o)}$ necessarily involves some specification of a more or less extended conceptual volume inside which is *a priori*. located the possibly stable effect of $G^{(o)}$ labeled $œ^{(o)}$ (again *a priori*). It is true that what will possibly be labeled $œ^{(o)}$ is pre-supposed - or even pre-*CONSTRAINED* - to emerge inside this or that space-time domain where $G^{(o)}$ acts, it is *researched* as corresponding to some definite verbal designation - "a manifestation of stellar life", or "a state of a microsystem", etc. Such an *a priori* posited conceptual environment is entailed by the specification required in D4, for *any* generator G, of the "zone" R_G from R where G is supposed to act. All this is true indeed. But :

> An *a priori* posited-and-constructed conceptual *environment* cannot be equated to a definite knowledge of the object-entity *itself*, specifically. It is only a *loose*, global, preliminary conceptual site, a conceptual net forged and attached to the physical action $G^{(o)}$ and then lowered with $G^{(o)}$ into the depths of pure as yet non-conceptualized physical factuality, in order to receive inside it the unknown results of the operation of generation $G^{(o)}$, so as to be *able* to hoist them up into the stratum of the concepts-and-language. This is an unavidable procedure because *only* a receptacle made of concepts-and-language can hoist up into the speakable a lump of pure factuality. An operation can be shown, teached, repeated, and also said. But if *nothing* were furthermore said about what it produces - which by hypothesis is not perceivable - then this, the product, even if factually it has been produced, *stays out of conceptualization*. While human mind, in order to be able to think efficiently about a thing, needs, not only to have labeled this thing but also to have given it some conceptual content and status. So, since what is pre-labeled $œ^{(o)}$ - a basic object-entity - consists of results of the operation $G^{(o)}$ that emerge still unknown themselves, specifically, it must be captured by construction inside a loose, non-specific pre-conceptualization. This however is *not* identifiable to knowledge of "$œ^{(o)}$" itself.

The creation of sense - in all its stages - is dominated by the implicit imposition of methodological, operational principles of "semantical homogeneity" (concepts must be localized inside nets of concepts ; in an equation the semantical dimensions from the first member must be the same as the semantical dimensions from the second member ; statistical-probabilistic qualifications *do not exist*

(in the sense of D7) with respect to individual events, they exist only with respect to statistical-probabilistic distributions of events ; and *vice versa*, individual qualifications do not exist in the sense of D7 with respect to statistical-probabilistic distributions, they are blind with respect to these, etc.). Now, any particular principle of semantical homogeneity is *pre-conditioned* by the deliberate introduction of a semantical volume (a genus) inside which to lodge the specific qualification researched for the considered object-entity itself, (its specific difference, i.e. its *own* semantical *position* inside the pre-posited semantical receptacle). In the absence of an explicit statement of this specific difference the object-entity *itself* simply is not yet defined *conceptually*, even if *factually* it is defined by the specification of the corresponding operation $G^{(o)}$ of object-entity generation. This leads to a quite fundamental question :

> Does indeed the definition D14.3.1 of a basic description open up some way toward a communicable characterization of - specifically - the basic object-entity $œ^{(o)}$?

The final posit from D14.3.1 concerns this question. Consider a basic description $D^{(o)}/G^{(o)},œ^{(o)},V_g^{(o)}/$ where the basic view consists of only one basic aspect $V_g^{(o)}$. It seems clear that in this case $D^{(o)}/G^{(o)},œ^{(o)},V_g^{(o)}/$ certainly does not yield a characterization, isolately, of $œ^{(o)}$, since it points toward observable manifestations brought forth by interactions between $œ^{(o)}$ and a material device for gk-registrations. Which *changes* what was labeled $œ^{(o)}$ (P10) and produces perceivable results that depend on the device for gk-registrations as much as of $œ^{(o)}$. But what about a "binocular" basic description $D^{(o)}/G^{(o)},œ^{(o)},V^{(o)}/$ where the basic view $V^{(o)}$ consists of *two* mutually *incompatible* basic views $V_{g1}^{(o)}$ and $V_{g2}^{(o)}$?$V_{g1}^{(o)}$ which "converge" in one same operation of $G^{(o)}$ of object-entity generation ? In quantum mechanics, for the particular case of a basic object-entity that is a state of a microsystem, it is (implicitely) admitted that - together - two descriptions of a same microstate *via* two mutually incompatible quantum mechanical views, characterize that microstate. Which means that no *other* operation $(G^{(o)})'$?$G^{(o)}$ of generation of a microstate can be assumed to yield *both* these same two descriptions. The final posit from D14.3.1 *generalizes inside MRC the above-mentioned quantum mechanical implication*. This completes on the observational level the methodological posit from D4 according to which a given operation of generation of an object-entity is assumed to always produce the same object-entity. The methodological necessity of a complement of this type can be best understood *per a contrario*. In the absence of any *phenomenal*, communicable, *specific* qualification associated with what has been labeled $œ^{(o)}$, one would have to regard "$œ^{(o)}$" as a label *that labels nothing distinct from itself*. Then speaking and thinking of "*what* has been labeled $œ^{(o)}$" would be only a void sophistic trick. We would be obliged to admit that pure factuality and human communicable knowledge stay for ever apart from one another. But this just does *not* happen. Quite on the contrary, our capacity to adapt to the environment and the technical powers that we are able to acquire manifest continually the astonishing, even miraculous agreement between human knowledge and factual being, so the intimate transmissions which somehow manage to emerge between them.

> *The posit from D14.1.3 incorporates into the MRC-representation a feature asserting a definite way in which a purely factual basic object-entity produced by a basic generator $G^{(o)}$, CAN be conceived to be hoisted up into the conceptual net of inter-subjective knowledge*.

At a first sight the concept of a basic transferred description might seem very particular, and too radical. But in fact *it possesses absolute priority and non restricted generality inside the order of cognitive elaborations* : quite universally, any object-entity corresponding to any generator, if it did reach the consciousness of an observer-conceptor, reached it *first* by some transferred descriptions. Usually the phenomenal appearance of the gk-values involved in these transferred descriptions (branch-qualifications) stems from marks imprinted upon the *biological* domains of sensitivity of the observer's body. This :

(a) Hides its transferred origin.

(b) Inclines toward assigning systematically a passive role to the mind, in its interactions with physical factuality. The mind is supposed to just *receive* marks irrepressibly imprinted upon the sensitive apparatuses of the body by incessant streams from the physical factuality. How far one is thus kept from becoming aware of the possibility and of the universal "legalizing" value of the radically active and strategic epistemic stages from the deliberate achievement of a transferred description, on which microphysics throws light!

(c) Pushes surreptitiously toward *ontological absolutizations*. Indeed one encounters severe difficulties to realize that the transferred descriptions of this chair, which my consciousness functioning achieved *spontaneously* by the help of my biological views (involving the eyes, the nervous system, the ears and fingers, etc.), *cannot*, without contradiction, be identified with the *model* to which I assign the verbal label «chair» - «a heavy object with a 3-dimensional characteristic form, etc.» (see D19.2 in the sequel in this text). It is difficult to genuinely realize that, in order to prevent naïve contradictions, any model compatible with the mentioned basic transferred description must be conceived to be only a synthetic communicable re-expression, an *intrinsic META-conceptualization* (see D19.1 in the sequel in this text) of the human phenomenal perception of the marks imprinted upon the human biological sensitive apparatuses in consequence of interactions between these biological apparatuses and the basic *unknown* object-entity labeled by the word «chair» ; that *nothing, never*, will be able to *prove* that this or that model exists *independently* of any perception, of *any view* ; more, that such an instinctive hope contradicts both philosophy *and logic*, since in the absence of any view the very concept of description, of qualification, vanishes. It is really hard to withstand the irrepressible trend toward identification of our spontaneous modelizations, with ontological credos that float on self-contradicting assemblages of words alike to Magritt's tree that floats with its roots in the air. Kant, Poincaré, Einstein, Husserl, Quine, have founded famous analyses on the explicit recognition of this fact.

But - and this is quite noteworthy - as soon as the transfer-view from a considered basic transferred description $D^{(o)}/G^{(o)},œ^{(o)},V^{(o)}/$ does not *directly* involve the biological human terminals - the nearest and which *in fine* cannot be eliminated -, as soon as the transfer-view $V^{(o)}$ from $D^{(o)}/G^{(o)},œ^{(o)},V^{(o)}/$ involves marks registered on devices that are exterior to the observer's body (as it happens indeed for micro-states), it suddenly becomes quite clear that $D^{(o)}/G^{(o)},œ^{(o)},V^{(o)}/$ itself constitutes a *constructed* intermediary object-entity which relays the access of the basic a-conceptual object-entity $œ^{(o)}$, to the observer-conceptor's consciousness-functioning. Then, like in quantum mechanics, the two distinct and mutually independent stages involved in a transferred description - the stage of generation of an object-entity $œ^{(o)}$, and the subsequent stage of creation of observable manifestations drawn from $œ^{(o)}$ by interaction with gk-registering devices - appear as obvious. Their active and deliberate character strikes the mind, and the invaluable normative value of the concept of basic transferred description can be fully understood.

D14.3.2. ***Basic relative description of a psychical object-entity***. Notwithstanding difficulties, the definition D14.3.1 can be more or less conveniently transposed to also non-physical - so psychical - *conscious* but *not* yet conceptualized basic object-entities $œ^{(o)}$: *"primeities" in the sense of Peirce*, that emerge in the acting observer-conceptor's interior universe, and, though perceived, are still entirely un-*known*, non-*qualified* (think of all the "impressions" of the bare "existence" of which one becomes suddenly aware without explicitly knowing as yet *how* they are, so *a fortiori* without "understanding" them ; and think of researches like that of Proust in order to identify qualifications permitting to know the subjective "meaning" of these). The obtained description is then a *basic relative description*

of a psychical object-entity. The same notation $D^{(o)}/G^{(o)},œ_G^{(o)},V^{(o)}/$ is maintained for such a transferred description also.

Let us make now global comments on the crucial concept of basic transferred description introduced by D14.3.1 and D14.3.2.

> So a *general* concept of transferred description is attained. The basic object-entity $œ_G^{(o)}$ from a transferred description $D^{(o)}/G^{(o)},œ_G^{(o)},V^{(o)}/$ roots this description *directly* into the physical or psychical factuality. Correlatively the transferred description $D^{(o)}/G^{(o)},œ_G^{(o)},V^{(o)}/$ achieves for the involved basic object-entity $œ_G^{(o)}$ a very *first* passage from pure physical or psychical factuality, into the domain of *communicable* knowledge. It yields for it a first communicable form, a first observable expression that points communicably toward the involved object-entity. The basic transferred descriptions are the *local zero-points* of the chains of conceptualization, in the following sense. Each basic transferred description $D^{(o)}/G^{(o)},œ_G^{(o)},V^{(o)}/$ starts from a conceptual situation where, eventhough some conceptual environment of the basic object-entity $œ_G^{(o)}$ (genus, etc.) is more or less explicitly posited *a priori* (at least *via* the definition D4 of $G^{(o)}$), nevertheles nothing is known concerning $œ_G^{(o)}$ *specifically* (p.25).
>
> The very first stratum of communicable knowledge available at any given time consists of the basic transferred *descriptions* achieved up to that time, *NOT* of just phenomena in Kant's sense.
>
> > The transferred descriptions are the channels through which as yet non semantized but semantizable factual matter, is adduced into the domain of the inter-subjectively semantized.
>
> The scientific legalization of phenomena in Kant's sense begins by the construction of transferred descriptions of which $D^{(o)}/G^{(o)},œ_G^{(o)},V^{(o)}/$ yields a form that is legalized, normed, in the sense of MRC. While the whole rest of the available knowledge consists only of subsequent developments of this first evolving stratum of transferred descriptions. This is a quite fundamental contribution of MRC to epistemology : it defines *the structure of the CONNECTION between knowledge and BEING*.
>
> I add a last remark concerning the concept of basic transferred description. From the viewpoint of MRC the quantum mechanical descriptions of micro-states appear as particular instances of transferred descriptions of physical entities : the strategy of quantum mechanics - once identified explicitly - brings into evidence an example of the universal way in which the conceptualizations are rooted into pure physical factuality, and inside this example it displays the stages of the rooting. *MRC re-expresses this universal rooting in general terms, normalizes it, and extends it to any sort of factuality*.

Finally, let us now consider globally the whole set of definitions D14 and make some comments on the general concept of relative description.

> The general notation $D/G,œ_G,V/$ stresses that any description that is normed in the sense of MRC brings into play a triad $G,œ_G,V$ to which it is essentially relative : *this is the general descriptional mould induced from quantum mechanics* and required now for any description, whether it is transferred, or not. The first location from this triad is the place reserved for an epistemic action - the generation of an object-entity - which up to now has quasi systematically been *ignored* because the canonical transferred descriptions where the generation of an object-entity plays a separate and active key role, were ignored. Indeed for a description that is not transferred, or is transferred on - directly - the biological sensorial apparatuses, the generation of the desired object-entity is accomplished

without difficulty, in a natural and *implicit* way. The involved biological sensorial apparatus - a view V - acts *also* like a generator G that just selects an object-entity (its field of perceptibility) out of R *and* - simultaneously - also qualifies it : we can symbolize by G(V) such a "generator of a view" and by (G(V),V)) the corresponding epistemic referential. This highly degenerate and so wide-spread natural situation contributed strongly to the lasting occultation of the fundamental role of principle of the operations of object-entity generation. Quantum mechanics, for the first time and only *implicitly*, made a *separate* use of the operations of genration of object-entity. This it permitted us to become aware of their fundamental methodological importance.

> The generator of object-entity remained the big omission of the grammars, the logics, and of all the approaches that involve the processes of conceptualization.

But from now on, on the basis of MRC, it will be clear that it is *always* involved, even if in a non separated and implicit way.
By construction, any relative description $D/G,œ_G,V/$ is - itself - distinct from the generator, the object-entity and the view involved by it, to all of which it is conceptually posterior ; it qualifies only the object-entity which it concerns, not also the generator and the view of which it makes use, nor itself, globally (this feature is consonant with the normalization introduced by Russell and by Tarski for the particular case of the logical conceptualizations). As for the generator and the view, these are by definition distinct from one another, often by their content, but in any case by the *role* held during the process of description.

> In the definition of a relative description the notations $G,œ_G,V$ designate descriptional *ROLES*, descriptional *functions*.

For instance, if I say «"red" is a too poor expression, better say "color of blood"», the first proposition expresses verbally a relative description $D/G,œ_G,V/$ where "red", though grammatically it is an attribute, holds the role of the object-entity $œ_G$ (generated by use of a generator G which is a selector acting upon the spot R_G from R indicated by the word "color"), while "poor" is placed in the role of the view V. But if I say «my cheeks are red», "red" plays the role of the view. According to MRC no concept possesses intrinsically a fixed descriptional role. In each descriptional act, the descriptional roles are assigned by the acting consciousness functioning, and in general this roles change from one description to another one. When a natural description is examined in order to compare it to the MRC norms, the first step is to examine *what* plays the role of object-entity, what that of generator, and what that of view. Because a normed description $D/G,œ_G,V/$ is a piece of constructed *meaning* which - essentially and explicitly - is relative to the epistemic actions that achieved the semantization asserted by it. *Any* asserted meaning bears inside it the genetic structure designated by the sign $D/G,œ_G,V/$, but it includes this structure in a more or less implicit, truncated, malformed way. Whereas in the normed form $D/G,œ_G,V/$ all the three involved roles $G,œ_G,V$ are explicitly indicated, each one at its own location and following the genetic order of the corresponding epistemic actions. They are to be treated as void, available, labeled rooms that have to be filled up in a reference-questionnaire to which any achieved or envisaged description must be subjected.

> The distinction between the relativity to G and that to $œ_G$ - which might seem surprising at a first sight - *follows from the proposition ?12*. It is also intimately related with the impossibility, for language, to grasp and immobilize the factual *individualities*. Umberto Eco remarks : «The tragedy comes from this that man speaks always in a general manner about things which always are singular. Language names, thus covering the non transgressible evidence of individual existence» [15]. Indeed each predicate (view) is general, and no conjunction of a finite number of predicates can exhaust the open infinity of the possible qualifications of a physical object-entity.

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[15] Eco, U., *Kant et l'Ornithorynque*, Grasset 1999, p. 29. My translation from the French edition.

The concept of relative description is *selective*. For instance, it does not admit inside the class delimited by it the description «I am 45 lines long» where the word "I" masks the absence of specification of the epistemic referential (G,V) which is required by *method*, because - previously to any research of truth-qualification - one cannot decide concerning relative existence, so concerning the possibility of *meaning*, without knowing *what* object-entity is considered, i.e. how this object-entity is generated. This sort of non-decidabilities concerning meaning reveal themselves later in the form of a paralysis of any attempt at a meta-qualification of the considered assertion (description) *via* the values gk="true" or gk="false" of the aspect-view g="factual truth". Analogous considerations hold for the famous description «I am a liar» where each one of the three roles $G,œ_G,V$ is found to be fulfilled in a way that is "illegal" with respect to the norms posited by MRC. When such non canonical descriptions are reconstructed in a normalized way, the paradoxes generated by them disappear. There is no need for this to introduce a new "logical type" (Russell) or a whole level of logical language (Tarski), the illness is *locally* treated by the normed reconstruction of *only* the considered description, inside a framework of general rules of conceptualization, "logical" or *not*. But nothing hinders to generate (select) as an object-entity any natural description excluded by MRC, and to characterize its incapacities or specificities by reference to the MRC-norms. In this sense the methodological selectivity of the concept $D/G,œ_G,V/$ by no means constitutes a pauperization of the ensemble of descriptions.

P15. ***The Principle of Separation***. Since any *one* relative description $D/G,œ_G,V/$, whatever its complexity, involves by construction one generator of object-entity, one object-entity, and one view, all well defined, as soon as some change is introduced in the content or the role designated by a term from the triad $G,œ_G,V$, *another* description is considered. By a *methodological* principle called the *principle of separation* and denoted PS, this other description must be treated *separately*.

Any human observer-conceptor, in presence of reality, is condemned to parceling examinations. The successivity inherent in human mind, the spatial confinements imposed by the bodily senses - whatever prolongations are adjusted to them - and the absence of limitation of what is called reality, compose together a configuration which imposes the fragmentation of the epistemic quest. MRC reflects this situation in the relativity of any *one* description, to *one* triad $G,œ_G,V$. Indeed the relativity to one triad $G,œ_G,V$ specifies, but also *limits* the capacity to generate information possessed by a given relative description :

Relativization and limitation are indissolubly tied to one another.

On the other hand any fragment generated out of reality in order to play the role of an object-entity would admit of an infinity of kinds of examinations. Moreover any achieved examination raises the question of its *global* appearance *via* this or that view with respect to which it now exists in the sense of D7, or of its relations to other object-entities, etc., thus multiplying the conceivable subsequent examinations. These confinements and these endless and changing vistas call forth hastes and panics of the mind that entangle in knots of "paradoxes" and block the understanding. So they also block the further development of the started conceptualization. The limitations imposed by each specified description are flooded by the implicit fluxes of the rush toward more conceptualization. Without being aware of this, mind yields to whirls of implicit interrogations which generate a subliminal tendency to *fluctuate* between different operations of generation of an object-entity, different object-entities, different views ; a tendency to work out simultaneously several different descriptions. But as soon as several different relative descriptions are simultaneously attempted, the roles and the contents of the various involved generators of object-entity, of the various object-entities and views, are offered a ground for oscillation. And then the oscillations actually happen because it is very difficult to perceive them, so a *fortiori* to hinder them. So the different descriptions that are simultaneously attempted, get mixed, and in general none of them can be achieved. Their interaction coagulates

nonsense that stops the conceptualization. The principle of separation hinders such coagulations. It methodologically requires the conceptualization to be achieved by explicit separation in mutually distinct, successive, closed, *cellular* descriptional steps.
In particular the principle of separation PS surveys the *saturation* of a description. It rings the bell as soon as the descriptional capacities of a started description must be considered to have been exhausted, because all the qualifications *via* the view chosen for *that* description, of the object-entity corresponding to the generator from *that* description, have been already realized by performing a big number of repetitions of *all* the pairs **[**(one operation of G-generation of $œ_G$), (one operation of V_g-examination of that replica of $œ_G$)**]** available in *that* description. PS announces that once this has been done the descriptional cell potentially delimited by the chosen epistemic referential (G,V) has been saturated with actualized qualifications ; that from now on any attempt at obtaining new informations inside this same epistemic referential manifests the surreptitious intrusion of *another* generator of object-entity, or of *another* view, of both ; that - to avoid stagnation, paradoxes or infinite regressions - one has to stop this intrusion and mixture by *identifying* the new epistemic referential that weighs with subliminal pressure upon the consciousness functioning, and by putting it *explicitly* to work in its own turn, *separately*.
The systematic application of the principle of separation plays, in the development required by MRC for a process of conceptualization, a role similar to that hold in the transmission or writing down of a message, by the sign "." or the word "stop" ; or else, a role similar to that played in algebra by the closure of a previously opened parenthesis. Thereby any process of conceptualization normed accordingly to MRC is clearly divided in a sequence of *localized descriptional cells* and thus it develops in systematically renewed local frameworks, under systematically renewed local control.
While the tests of mutual existence (D7) detect the *a priori* impossibilities to construct meaning, the principle of separation permits to avoid any stagnation - illusory paradoxes, infinite regressions - throughout the processes of development of meaning. The concepts of mutual inexistence and the principle of separation cooperate for the task of detecting sources of unintelligibility.

D16. ***Relative meta-description***. The principle of separation requires descriptional closures and new starts. These entail the necessity of an explicitly and fully relativized concept of meta-description prescribing how to transgress "legally" an already saturated description.

Consider a precedingly achieved relative description D/G,$œ_G$,V/. Consider a generator that selects D/G,$œ_G$,V/ as a new object-entity $œ_G^{(2)}$, denote it $G^{(2)}$ and call it a *meta-generator (or a generator of order 2) relative to* D/G,$œ_G$,V/. Consider also a view involving *aspects of order 2* with respect to which D/G,$œ_G$,V/ does only *globally* exist in the sense of D7 (for instance the aspect of factual truth of D/G,$œ_G$,V/, or else an aspect of relation inside D/G,$œ_G$,V/ between the various gk-space-time qualifications produced by the examinations of $œ_G$ by the initial view V), call it a *meta-view (or a view of second order) relative to D/G,$œ_G$,V/* and denote it $V^{(2)}$. The description which is relative to the triad $G^{(2)}$,$œ_G^{(2)}$,$V^{(2)}$ will be called a *meta-description (or a description of order 2) relative to D/G,$œ_G$,V/* and it will be denoted $D^{(2)}/G^{(2)},œ_G^{(2)},V^{(2)}/$.

The same denomination and notation are conserved if ***(a)*** $G^{(2)}$ selects as a new object-entity $œ_G^{(2)}$ not only D/G,$œ_G$,V/ considered globally, but furthermore includes in $œ_G^{(2)}$ *elements* from D/G,$œ_G$,V/ specified *explicitly* (G, or $œ_G$, or V, or two or all of them) which permits to introduce then in $V^{(2)}$ aspects of relation between such an element, and the global

result D/G,œ$_G$,V/ to which it has contributed. Or if ***(b)*** G$^{(2)}$ selects a whole *set* {D_1, D_2,...D_m} of previously achieved relative descriptions, together - or not - with explicit reconsideration of elements from these descriptions (then D$^{(2)}$ is relative to all these descriptions). In this way a very free and rich concept of normed relative meta-description is introduced.

The definition D.16 can also be applied to D$^{(2)}$/G$^{(2)}$,œ$_G^{(2)}$,V$^{(2)}$/ thus leading to a meta-description D$^{(3)}$/G$^{(3)}$,œ$_G^{(3)}$,V$^{(3)}$/ of order 3 relatively to D/G,œ$_G$,V/ and of order 2 relatively to D$^{(2)}$/G$^{(2)}$,œ$_G^{(2)}$,V$^{(2)}$/, etc. In this way it is possible for any consciousness-functioning CF to develop *unlimited* descriptional chains D, D$^{(2)}$,...D$^{(j)}$..D$^{(n-1)}$, D$^{(n)}$ of hierarchically connected relative descriptions of successive orders j=1,2,....n, in each one of which the involved meta-view can contain all the desired pertinent new meta-aspects of order n.
It essential to note that in any such chain, for *each* passage from a descriptional level n to the following level n+1, the new epistemic referential to be used (G$^{(n+1)}$,V$^{(n+1)}$) is freely decided by the acting consciousness-functioning CF, as an expression of his own descriptional curiosities-and-aims such as they emerge from his own biological, temperamental, cultural, social background : it is Cf who, step by step, chooses the direction of the descriptional trajectory drawn by the succession of the cellular but connected descriptional closures D, D$^{(2)}$,...D$^{(j)}$,...D$^{(n-1)}$, D$^{(n)}$ which, accordingly to [P15+D16], constitute the indefinite progression of a hierarchical chain.

? **17. *Proposition***. Inside MRC the "reduction" of a meta-description of order n (D.16) to the descriptions and elements of descriptions of order n-k, k=1,2,...n-1 involved in it, is in general *impossible*.

Consider the meta-object œ$_G^{(n)}$ from a meta-description D$^{(n)}$/G$^{(n)}$,œ$_G^{(n)}$,V$^{(n)}$/. An *isolated* element from œ$_G^{(n)}$ - a description $D_j^{(n-1)}$ of order n-1, or an element of order n-1 from such a description - in general simply does *not exist* in the sense of D7 with respect to the new meta-aspects *of order n* from V$^{(n)}$. For instance, a meta-view V$^{(2)}$ of order 2 from the meta-description D$^{(2)}$/G$^{(2)}$,œ$_G^{(2)}$,V$^{(2)}$/ relative to D/G,œ$_G$,V/ can contain the aspect of factual truth of D/G,œ$_G$,V/ with respect to which œ$_G$ alone does not exist ; or else, œ$_G^{(2)}$ can contain two previously achieved descriptions of physical object-entities, D_1/G,œ$_{G1}$,V/ and D_2/G_2,œ$_{G2}$,V/, involving both the same view V, and V$^{(2)}$ can contain a meta-aspect of order 2 of *comparison* of the triads of gk-space-time values yielded by D_1 and D_2, whereas neither D_1 alone nor D_2 alone do exist in the sense of D7 with respect to this meta-aspect of order 2.
So, in general terms now, the *new* qualifications of order n introduced by a meta-description D$^{(n)}$/G$^{(n)}$,œ$_G^{(n)}$,V$^{(n)}$/, i.e. the qualifications that are not involved in the descriptions of order n-1 from œ$_G^{(n)}$ -, consist exclusively of *GLOBAL* or *CONNECTIVE* meta-qualifications of order n concerning *elements* of order *n-1* from œ$_G^{(n)}$ (descriptions, generators of object-entities, object entities, views, of order n-1) : considered *separately* the elements from œ$_G^{(n)}$ simply *do not exist in the sense of D7* with respect to any of these new meta-qualifications, while other groupings *different* from œ$_G^{(n)}$ involving one or several (not all) elements of order n-1 from œ$_G^{(n)}$ certainly do not reproduce *all* the new meta-qualifications of order n from D$^{(n)}$/G$^{(n)}$,œ$_G^{(n)}$,V$^{(n)}$/.

On each descriptional level of a given order n from a descriptional chain (D.16), the descriptional cell $D^{(n)}/G^{(n)},œ_G^{(n)},V^{(n)}/$ placed on this level introduces *new* qualifications of which the very *definability and meaningness* are conditioned by the previous achievement of the descriptions from the level n-1, n-2, ...n-n : *throughout the development of a process of conceptualization normed accordingly to MRC one can literally watch the creative complexifying work of cognitive time*.
It is remarkable that inside MRC this conclusion follows deductively from the system of basic definitions, postulate and principles, in a way that permits a clear perception of the contributions, in its content, from factual elements on the one hand and on the other hand from operational-methodological elements : there is no need any more of pleading, arguments, etc. for gaining access to the necessary character, the mechanisms and the features, of what is labeled by the words "complexity" and "complexification".

So, by normed complexification, the transferred descriptions that start from inside pure factuality and by which phenomena acquire a first communicable form, are then developed in unlimited chains of hierarchically connected meta-descriptions of increasing order. These chains can meet and interact and at various levels and thus they weave *indefinitely* compexifying forms of communicable significances.
The consequences of the association between the principle of separation and the concept of relativized meta-description, are innumerable, always important, and *non identifiable systematically* in the absence of a normed reference.

?**18**. Three propositions , one on "identity" and two on "realism" :

?**18.1 ("identity")**. A basic object-entity is inexistent in the sense of D7 with respect to a "comparison-view" : such a view is a *meta*-view with respect to which only *descriptions* exist in the sense of D7.

What is not already pre-qualified cannot be compared. Only two (or more) previously achieved *descriptions* D_1 and D_2 can be compared, and only concerning some *definite* aspect-view or view. One can for instance ask : are D_1 and D_2 identical or different with respect to gk-values of the aspect-view V_g? This question entails definite V_g-examinations permitting a definite answer : either "identical with respect to g" or "different with respect to g". In this case one has brought into play a *most simple* comparison-view, which nevertheless is already - quite essentially - a meta-view, namely the meta-view of comparison $V_c^{(1)}$ with respect to only one aspect g and endowed with only two values : ci="identical with respect to g" and cd="different with respect to g". One can form much richer comparison views. But *all* - essentially - are meta-views relative to definite views with respect to which only previously achieved descriptions exist in the sense of D7. A basic object-entity - a bulk of pure *a-conceptual* factuality - cannot be compared, neither to "itself" nor to something else.

This finally establishes *deductively* inside MRC, by a counter-example, the impossibility - in *general* - to assign meaning to the question whether yes or not the repetition of a given operation G of generation of an object-entity $œ_G$, produces always identical results $œ_G$. So the initial decision to assert methodologically a one-to-one relation between G and $œ_G$, is justified *a posteriori*. This, once more, illustrates the reflexive character of the MRC-dynamics of conceptualization.

?**18.2 ("realism")**.

?**18.2.1**. Consider first only a fragment of physical reality consisting of a *physical* object-entity $œ_G$. Inside MRC the fact that the sequence of words "knowledge of the way in which $œ_G$ is in intself" is void of significance, *follows* from the relativity of any basic

description, to a basic view and from the fact that any communicable knowledge is description.

> Since Kant the impossibility to know how a physical entity "is-in-itself" is accepted as an obvious postulate inside philosophy. But is seems worth mentioning explicitly that inside MRC this *follows*, i.e. that there is no need to assert it as a logically independent assertion. Indeed consider a - physical - object-entity $œ_G$. Any communicable knowledge concerning $œ_G$ amounts to some relative description of $œ_G$. Any relative description of $œ_G$ belongs to some net of descriptional chains that is rooted in pure factuality *via* a (finite) number of *basic* transferred descriptions $D^{(o)}/G^{(o)},œ_G^{(o)},V^{(o)}/$ where the basic object-entity $œ_G^{(o)}$ somehow "participates" in $œ_G$, has transmitted into it some of its own semantical substance. Now, in each one of these basic transferred descriptions, the transfer-view $V^{(o)}$ acting there yields a very *first* access to observability for the involved basic object-entity $œ_G^{(o)}$.
>
> > But while it yields this access $V^{(o)}$ also inserts a non removable *opaque screen* between the consciousness-functioning and "$œ_G^{(o)}$-in-itself": the relativity of any basic description - a description of a fragment $œ_G^{(o)}$ of pure physical factuality -, to some basic *transfer*-view, bars the way of human mind toward this fragment of the physical being in-itself : the unavoidable descriptional relativities explicated in MRC, and the fact that communicable knowledge is description, *entail* inside MRC that (communicable) [knowledge-of-the-physical-reality-as-it-in-itself] is a non-sense.
>
> The *indefinite multiplicity* of the possible basic views $V^{(o)}$ which - now or in the future - could be found to exist in the sense of D7 with respect to $œ_G^{(o)}$, stresses even more the illusory character of the hope that in spite of all some model could some day be somehow proved to definitively inform us on how $œ_G^{(o)}$ "is-in-itself", independently of any perception. Indeed, given the unpredictable complexifications brought forth by the various unbounded hierarchical chains of meta-descriptions, how could one imagine an *a priori* globality insuring some sort of convergence toward a definite terminal descriptional system ?

?**18.2.2**. Inside MRC the realist postulate P3 can only be given a *MINIMAL* significance : it can only be understood to assert *EXCLUSIVELY* the credo of the *EXISTENCE* of also a physical reality independent of any any act of observation, but which is strictly *non-qualifiable* "in-itself", beyond the mere trivial and non-informative assertion of its relativized qualifia*bility* if acts of observation of it do take place in the conditions D4-D7 (in the absence of which P3 would be aimless).

> By the definition D2 "the physical reality" - globally considered - is just the posited substratum wherefrom all the basic object entities considered in ?18.1. are conceived to be extracted. Only this and nothing more. It would be a kind of *inconsistent induction* (or extrapolation) to assign to this substratum properties that are essentially different from those of all these basic object-entities.
> It is quite non-trivial that inside MRC this minimality of the realist postulate P3 is a feature that emerges as a *consequence* - in the above sense - of the non removable descriptional relativities. So much more so that the force withstanding the distinction between existence of something, and *knowledge* of *how* this something *is*, is huge.

D19. *Intrinsic Meta-Conceptualisation of an Individual Tansferred Description of a Physical Object-Entity. Intrinsic Model of a Basic Physical Object-Entity* (refs. 8,11,12,14).

We shall now close this exposition of the nucleus of MRC by defining two concepts which, while they illustrate the general concept of meta-description, are crucial by themselves because they throw still more light on the fundamental question of realism, and furthermore they introduce a new and seminal concept, that of "genset".

Preliminaries. Consider first an *individual* transferred description $D^{(o)}/G^{(o)},\text{œ}^{(o)},V^{(o)}/$ of a physical basic object-entity (for any aspect-view $V_g^{(o)}$ from the basic view $V^{(o)}$, when the pair **[**(one operation $G^{(o)}$ of generation of a replica of $\text{œ}^{(o)}$), (one $V_g^{(o)}$-examination of that replica of $\text{œ}^{(o)}$)**]** is repeated, always the *same* value gk is obtained). In this case the pairing $(G^{(o)},V^{(o)})$ *does* insure a certain stability of the transferred results, namely an individual stability, the strongest possible sort of stability for qualifications of a physical object-entity $\text{œ}^{(o)}$ (?12, ?13, D14.1). Thereby - supposing that $V^{(o)}$ contains at least two mutually incompatible aspect-views $V_g^{(o)}$- one finds oneself already in possession of an observational invariant that associates a definite *meaning* to what has been labeled *a priori* "$\text{œ}^{(o)}$" (see comments on the posit contained in the definition D14.1.3). It might be argued that this "suffices", that no further specifications should be researched concerning what was labeled $\text{œ}^{(o)}$. But the fact is that in general such a "sufficiency" simply is not *experienced* by the observer-conceptors. In presence of a transferred description $D^{(o)}/G^{(o)},\text{œ}^{(o)},V^{(o)}/$ many thinkers (if not most) - quite modern thinkers, and even physicists - experience an irrepressible tendency toward a subsequent epistemic elaboration that shall produce a better, a clearer meaning assignable to what was labeled $\text{œ}^{(o)}$. But a better, a clearer meaning of $\text{œ}^{(o)}$, *in what a sense* exactly ?

When one tries to answer this question it appears that what is researched is a representation of $\text{œ}^{(o)}$ that shall endow it with an *OWN* form of space-time-gk-values, *separated* from any process of observation and any registering device ; and moreover a form of space-time-gk-values possessing "unity", i.e. covering a connected space-domain obeying some definite dynamical law. The space-time structure involved by a basic transferred description $D^{(o)}/G^{(o)},\text{œ}^{(o)},V^{(o)}/$ of $\text{œ}^{(o)}$ does *not* meet these requirements. Indeed such a description is expressed in terms of observable features *OF registering devices* which are all *distinct* from what is labeled $\text{œ}^{(o)}$. This yields no representation *WHATEVER* of the basic object-entity $\text{œ}^{(o)}$. *A fortiori* $\text{œ}^{(o)}$ is not yet constructed inside $D^{(o)}/G^{(o)},\text{œ}^{(o)},V^{(o)}/$ as an *autonomous individuality* endowed with an *own* and connected form. Furthermore - even if any reference to $\text{œ}^{(o)}$ is dropped - the "form" of space-time-gk-values involved by $D^{(o)}/G^{(o)},\text{œ}^{(o)},V^{(o)}/$ is found to cover a scattered domain of space tied with different registering devices that can lie arbitrarily far from one another. It is not even possible to assign to this form some continuous evolution or persistence ordered by a unique increasing

time-parameter : the time-origin t_0 has to be re-established after each realization of a pair **[**(one operation $G^{(o)}$ of generation of a replica of $œ^{(o)}$), (one $V_g^{(o)}$-examination of that replica of $œ^{(o)}$)**]**. This is why a basic transferred description $D^{(o)}/G^{(o)},œ^{(o)},V^{(o)}/$ is not perceived as an *achieved* representation of the basic object-entity $œ^{(o)}$. It is not felt to possess a conceptual position of epistemological equilibrium. It is obscurely felt as if loosely hanging on a steep conceptual slope where an attraction toward a more achieved representation of $œ^{(o)}$ were working on it. *Not* toward "knowledge" of how $œ^{(o)}$ "really is" - such a naïve epistemic quest is here supposed to have been entirely trangressed -, but toward just a possible modus of *thinking* of $œ^{(o)}$ in a self-consistent, transparent, intellectually operational way that shall be naturally insertable into the current language-and-conceptualization. This sort of need might be regarded as a methodological instinct induced by the adaptive biological evolution of our minds.

All the preceding remarks hold *a fortiori* concerning a probabilistic transferred description. The now seventy years old debate on the interpretation of quantum mechanics proves this enough.

So how can a basic transferred description $D^{(o)}/G^{(o)},œ^{(o)},V^{(o)}/$ of a physical object-entity be developed into a *separated* representation of that object-entity $œ^{(o)}$? Inside MRC the answer involves two successive abstract elaborations, first an "intrinsic meta-conceptualization of $D^{(o)}/G^{(o)},œ^{(o)},V^{(o)}/$" and then the separation of an "intrinsic model of $œ^{(o)}$".

D19.1. *Intrinsic Meta-Conceptualisation of an Individual Tansferred Description of a Physical Object-Entity*. Consider an individual basic, transferred description $D^{(o)}/G^{(o)},œ^{(o)},V^{(o)}/$ of a physical object-entity.

- Let $G^{(1)}$ be a meta-generator of object-entity consisting of a conceptual selector (D4) that selects for examination the meta-object-entity $[œ^{(1)}=D^{(o)}/G^{(o)},œ^{(o)},V^{(o)}/]$.

- Let $V_I^{(1)}$ indicate an "*intrinsizing meta-view* " - with respect to $D^{(o)}/G^{(o)},œ^{(o)},V^{(o)}/$ - (I : *intrinsizing*) which, starting from the initial, observational, transferred description $D^{(o)}/G^{(o)},œ^{(o)},V^{(o)}/$, works out *intrinsic qualifications of* $œ^{(o)}$ (intrinsic : "own", word used in order to distinguish from the philosophical term "in itself"). This, inside the epistemic referential $(G^{(1)},V_I^{(1)})$, is achieved as follows.

* Let $V_{Ig}^{(1)}$ (I fixed, g=1,2,...m, Ig functioning as *one* index) be m intrinsizing meta-aspect-views which, together, constitute the meta-view $V_I^{(1)}$.

* Each intrinsizing meta-aspect-view $V_{Ig}^{(1)}$ involves an *abstract*, conceptual $V_{Ig}^{(1)}$-examination *of the meta-object-entity* $[\text{œ}^{(1)}=D^{(o)}/G^{(o)},\text{œ}^{(o)},V^{(o)}/]$, required such that its result - a value (Ig)k of $V_{Ig}^{(1)}$ (see D.5.1) - be conceivable as an intrinsic qualification (Ig)k *of the basic object-entity* $\text{œ}^{(o)}$, a qualification that is consistent with $D^{(o)}/G^{(o)},\text{œ}^{(o)},V^{(o)}/$, i.e. entailed by $D^{(o)}/G^{(o)},\text{œ}^{(o)},V^{(o)}/$ *via* $V_{Ig}^{(1)}$).

* The values (Ig)k of $V_{Ig}^{(1)}$ are constructed as qualifying (intrinsically) $\text{œ}^{(o)}$ *at the time* t_o that is the time-origin re-established after the realization of any pair **[**(one operation $G^{(o)}$ of generation of a replica of $\text{œ}^{(o)}$), (one $V_g^{(o)}$-examination of that replica of $\text{œ}^{(o)}$)**]** having contributed to the elaboration of $D^{(o)}/G^{(o)},\text{œ}^{(o)},V^{(o)}/$ (it is the time when the operation $G^{(o)}$ just came to its end) ; furthermore the values (Ig)k of $V_{Ig}^{(1)}$ are constructed as being located inside a (connected) space-volume $?^3\mathbf{r}$ which $\text{œ}^{(o)}$ is posited to occupy at t_o.

The relative meta-description constructed as specified above will be called an *intrinsic meta-conceptualisation of the basic transferred description* $D^{(o)}/G^{(o)},\text{œ}^{(o)},V^{(o)}/$ and will be denoted $D_I^{(1)}/G^{(1)},\text{œ}^{(1)},V_I^{(1)}/$.

An intrinsic meta-conceptualisation of a basic transferred description $D^{(o)}/G^{(o)},\text{œ}^{(o)},V^{(o)}/$ realizes a *retro-active* focalizing projection of the scattered form of $D^{(o)}/G^{(o)},\text{œ}^{(o)},V^{(o)}/$, onto a connected and instantaneous space-time domain $[(?^3\mathbf{r})\text{-}t_o]$. The uniqueness of the temporal qualification t_o, eventhough it is retro-active, suffices now for permitting to conceive of an intrinsic time-order that is hidden to observation ; so of a law of intrinsic evolution of what has been labeled $\text{œ}^{(o)}$, underlying any evolution of the basic transferred description $D^{(o)}/G^{(o)},\text{œ}^{(o)},V^{(o)}/$. The transferred description $D^{(o)}/G^{(o)},\text{œ}^{(o)},V^{(o)}/$ can now finally be *explained*. The basic object-entity $\text{œ}^{(o)}$ can now be conceived to have "possessed" at the time t_o - on the connected spatial domain $?^3\mathbf{r}$ - the features assigned to it by the intrinsic meta-conceptualization $D_I^{(1)}/G^{(1)},\text{œ}^{(1)},V_I^{(1)}/$. These, one can now think, were *own* features of $\text{œ}^{(o)}$, separated from those of any measurement device. The scattered form of space-time-gk-values involved by $D^{(o)}/G^{(o)},\text{œ}^{(o)},V^{(o)}/$ can now be thought of as the result of a bursting of the initially integrated intrinsic features of $\text{œ}^{(o)}$ itself. A bursting produced by the mutual incompatibility of certain aspect-views from the transfer-view $V^{(o)}$ - remember that at least two such incompatible transfer-aspect-views are necessary in order to characterize $\text{œ}^{(o)}$ (D19.1) - which has obliged to perform a set of *different* pairs **[**(one operation $G^{(o)}$ of generation of a replica of $\text{œ}^{(o)}$), (one $V_b^{(o)}$-examination of that replica of $\text{œ}^{(o)}$)**]** in order to obtain the global basic transferred description $D^{(o)}/G^{(o)},\text{œ}^{(o)},V^{(o)}/$. The emergence of $D^{(o)}/G^{(o)},\text{œ}^{(o)},V^{(o)}/$ has been *causalized*.

D19.2. *Intrinsic Model of a Physical Basic Object-Entity*. The set of intrinsic qualifications of the basic object-entity $\text{œ}^{(o)}$ produced by $D_I^{(1)}/G^{(1)},\text{œ}^{(1)},V_I^{(1)}/$ - *separated from its genesis*, severed from all the other elements from $D_I^{(1)}/G^{(1)},\text{œ}^{(1)},V_I^{(1)}/$ - will be

called an *intrinsic model of* $œ^{(o)}$ *relative to* $V^{(o)}$ *and* $V_I^{(1)}$. It will be symbolized by $[IM(œ^{(o)})/(V^{(o)},V_I^{(1)})]$.

It is crucial to realize clearly that the intrinsic model $[IM(œ^{(o)})/(V^{(o)},V_I^{(1)})]$ is *not* a relative description *of* $œ^{(o)}$ in the sense of D14.

The meta-aspect-views from $V_I^{(1)}$ that produced the qualifications of $œ^{(o)}$ selected in $[IM(œ^{(o)})/(V^{(o)},V_I^{(1)})]$ have examined the meta-object-entity $œ^{(1)}=D^{(o)}/G^{(o)},œ^{(o)},V^{(o)}/$, *not* the basic object-entity $œ^{(o)}$.

The model $[IM(œ^{(o)})/(V^{(o)},V_I^{(1)})]$ occupies now a position of epistemological saturation and equilibrium of the meaning assigned to what was labeled $œ^{(o)}$. It conveys the feeling that finally $D^{(o)}/G^{(o)},œ^{(o)},V^{(o)}/$ can be fully "understood". It superposes to $D^{(o)}/G^{(o)},œ^{(o)},V^{(o)}/$ a pragmatic, economic and stable closure. Namely a closure consisting of an *invariant* with respect to the group of transformations - inside the process of elaboration of $D^{(o)}/G^{(o)},œ^{(o)},V^{(o)}/$ - from one pair **[**(one operation $G^{(o)}$ of generation of a replica of $œ^{(o)}$), (one $V_g^{(o)}$-examination of that replica of $œ^{(o)}$)**]**, to another such pair with a different aspect-view in it, ($G^{(o)}$ being fixed).
This sort of closure is felt as satisfactory and as "necessary" to such a degree that the *hypothetical*, *retro-active,* and *relative* character of any intrinsic model tends to be skipped. The unavoidable dependence of any intrinsic model of $œ^{(o)}$, on - both - an initial transferred description $D^{(o)}/G^{(o)},œ^{(o)},V^{(o)}/$ involving some *particular* transfer-view $V^{(o)}$, and an intrinsic meta-conceptualization $D_I^{(1)}/G^{(1)},œ^{(1)},V_I^{(1)}/$ involving a *particular* intrinsizing meta-view $V_I^{(1)}$, tends to be overlooked. It tends to remain unnoticed that *another pair* $(V^{(o)},V_I^{(1)})$ *would have led to a different model. of* $œ^{(o)}$.

These occultations mark all the classical descriptions, in physics, in mathematics, etc., as well as in the current thinking expressed by the current language : they are the floor on which is erected the classical concept of objectivity, covering a conceptual void.

Starting from the transferred data that are available for it and on which it takes support without trying to express them, human mind always rushes as rapidly and as directly as it can toward a representation of the involved object-entity by an intrinsic model. As soon as such a representation has been attained it is spontaneously felt to be "true" in a *certain* and *ABSOLUTE* way, without reference to the transferred data on which it is founded and forgetting that it is just an economic, hypothetical, retro-actively imagined *construct*. While these initial transferred data, though they are the *sole* certainties, are perceived implicitly (because of their phenomenal nature) as nothing more than "subjective" tools for finding access to the "objective truth". *An illusory inversion*. Simplicity, invariance, and what we tend to call "truth" and "objectivity", have here coalesced in a fallacious knot imprinted upon our minds by ancestral processes of optimization of our behaviour, by implicit pragmatical causalizations.

Inside MRC the distinction between illusory ontological assertions concerning the way in which "$œ^{(o)}$ really-is-in-itself", and *relative METHODOLOGICAL* models of $œ^{(o)}$, is quite radical, constructed, and clear cut.

Correlatively, the vain and exhausting battle between positivists and defenders of modelization, simply evaporates. The transferred descriptions are the unavoidable *first* stage of our processes of conceptualization, while the intrinsic meta-conceptualizations of the initial transferred descriptions and the relative models extracted from these are a stabilizing *subsequent* stage which, if realized, brings us down onto a - relative - minimum of our potential of conceptualization.

There is no choice to be made, there is just an unavoidable ORDER of elaboration to be realized, in a normed way.

D19.3. *The Minimal Intrinsic Meta-Conceptualization of a Basic Transferred Description of a Physical Object-Entity. MInimal Intrinsic Model.* Consider a basic transferred description $D^{(o)}/G^{(o)},œ^{(o)},V^{(o)}/$ of a physical basic object-entity. The effect labeled $œ^{(o)}$ of the basic operation $G^{(o)}$ of generation of the object-entity $œ^{(o)}$ can *always* be trivially meta-constructed accordingly to the definition D19.1 and D19.2 so as to be conceived as :

A bulk of *POTENTIALITIES of future observable manifestations RELATIVE to the aspect-views* $V_g^{(o)}$ *from the basic view* $V^{(o)}$ *and determined by* $G^{(o)}$ *on a finite space-domain* $?^3\mathbf{r}$ *at the time* t_o *when* $G^{(o)}$ *comes to an end.*

For this it suffices to posit in D19.1 a *minimal intrinsizing view* - let us denote it $(MIN.V_I^{(1)})$ - defined as follows. For each basic aspect-view $V_g^{(o)}$ from the basic view $V^{(o)}$, $(MIN.V_I^{(1)})$ contains a corresponding intrinsizing minimal meta-aspect-view $(MIN.V_{Ig}^{(1)})$ of which the - unique - *minimal meta-aspect-value* denoted (Ig_{MIN}) consists of the intrinsic potentiality assigned to what has been labeled $œ^{(o)}$, to produce - at a time $t_g>t_o$ - any one among the basic observable aspect-values gk of the basic aspect-view $V_g^{(o)}$, iff $œ^{(o)}$ is subjected at t_o to an $V_g^{(o)}$-examination (t_g-t_o : the duration of a $V_g^{(o)}$-examination ; and remember that "intrinsic" means here assigned to $œ^{(o)}$, by deliberate construction, as an "own" feature, the word having been chosen in order to distinguish from the philosophical meaning of the term "in itself").

The trivial realization of the definition D19.1 specified above will be called *the minimal intrinsic meta-conceptualization of the basic transferred description* $D^{(o)}/G^{(o)},œ^{(o)},V^{(o)}/$. It will be denoted $[MIN.D_I^{(1)}]$.

The result, as described above, of the procedure $[MIN.D_I^{(1)}]$ - considered alone - is a *minimal intrinsic model of* $œ^{(o)}$ *relative to* $V^{(o)}$. It will be denoted $[MIN.IM(œ^{(o)})/V^{(o)}]$. ($V_I^{(1)}$ being defined uniformly for any basic view $V^{(o)}$, the relativity to it is resorbed).

The following consequence of the final posit from D14.3.1 is quite worth noticing : any basic view $V^{(o)}$ that involves two mutually incompatible basic aspect-views $V_{g1}{}^{(o)}$ and $V_{g2}{}^{(o)}$?$V_{g1}{}^{(o)}$ defines a minimal model of $œ^{(o)}$ which now *characterizes* $œ^{(o)}$ *CONCEPTUALLY*, i.e. it yields a conceptual definition of $œ^{(o)}$ that can now be associated to, both, the purely *factual* definition first offered by the

operation $G^{(o)}$ alone - whereby $œ^{(o)}$ still remained *outside knowledge* - and the purely observational description of $œ^{(o)}$ offered by a basic description $D^{(o)}/G^{(o)},œ^{(o)},V^{(o)}/$ - whereby $œ^{(o)}$, though characterized if two mutually incompatible basic aspect-views are involved in $V^{(o)}$), nevertheless is still *devoid of an own conceptual representation* :

> MRC brings forth a progression in the degree of definition of $œ^{(o)}$. The degree of this definition traverses the complexifying sequence [factual? observational? conceptual].

This illustrates the reflexive powers of the method.

As any intrinsic meta-conceptualization and any intrinsic model, the minimal, trivial ones also may be perceived as "opportunistic" constructs where what is actually observed is posited to stem from an *a posteriori* imagined *ad hoc* explanatory potentiality. Nonetheless a minimal model - like any model - *is* a a representation of what is labeled $œ^{(o)}$ which now permits to insert $œ^{(o)}$ into the conceptualization. Moreover it is always realizable. It is however crucial to remember that this representation is proposed as just a *strategic modelization*, to be carefully distinguished from an ontological credo : nothing whatever is here naïvely asserted concerning the impossible question of how the basic object-entity $œ^{(o)}$ "really-is-in-itself". It is only stated how it can be conceived in order that we shall become able to speak and think of it in structured consistent terms (see D19.1 and D19.2 in the sequel of this work).

D19.4. *The GENSET of a Physical Basic Epistemic Referential*. Consider a basic transferred description $D^{(o)}/G^{(o)},œ^{(o)},V^{(o)}/$ (in short $D^{(o)}$) of a basic physical object-entity $œ^{(o)}$. The $V_g^{(o)}$-examination of each basic aspect-view from $V_g^{(o)}$ from the involved basic view $V^{(o)}$ produces, by repetitions of the pair **[**(one operation $G^{(o)}$ of generation of a replica of $œ^{(o)}$), (one $V_g^{(o)}$-examination of that replica of $œ^{(o)}$)**]** (in short $[G^{(o)},V_g^{(o)}]$), a collection of observable results (marks on devices) translatable, *via* coding rules involved in the definitions of the aspect-views, in terms of "values" gk of the aspect-view $V_g^{(o)}$ (D5.1). From a logical point of view these gk-values constitute a class tied with $V_g^{(o)}$ while from a mathematical point of view they constitute a set of elements. So we shall call it the class-set tied with $V_g^{(o)}$. The whole transferred description $D^{(o)}/G^{(o)},œ^{(o)},V^{(o)}/$ can be regarded as [the set of (all the class-sets of observable gk-values determined by a pair $[G^{(o)},V_g^{(o)}]$ with $V_g^{(o)}$ contained in $V^{(o)}$)].

Consider now a minimal intrinsic meta-conceptualization $[MIN.D_I^{(1)}]$ of $D^{(o)}$. There $D^{(o)}$ is "explained" in terms of a bulk of *potentialities* of observable manifestations relative to the aspect-views $V_g^{(o)}$ from $V^{(o)}$ and located inside a space-time domain $[(?\mathbf{r})\text{-}t_o]$; a bulk of potentialities - the minimal model $[MIN.IM(œ^{(o)})/V^{(o)}]$ formed for what has been labeled $œ^{(o)}$ - which the processes of *actualization* by repetitions of each one of the pairs $[G^{(o)},V_g^{(o)}]$ with $V_g^{(o)}$ contained in $V^{(o)}$) transpose into the *actualized* [set of class-sets] of which $D^{(o)}$ consists. Inside this explanation of $D^{(o)}$ each element gk from a class-set from $D^{(o)}$ is now assigned a *GENESIS* that leads from a relative potentiality to the actualized

observable result gk, *via* a process of actualization. So the minimal intrinsic meta-conceptualization [MIN.$D_I^{(1)}$] can be globally regarded as a *new* sort of set, with a *new* sort of elements : [the set of (all the class-sets of *geneses* of observable values gk determined by a pair [$G^{(o)}$,$V_g^{(o)}$] with $V_g^{(o)}$ contained in $V^{(o)}$)]. We call this new sort of set *the genset of* $D^{(o)}$ or *the genset of the basic epistemic referential* $[G^{(o)},V^{(o)}]$. It will be denoted G[($G^{(o)}$,$V^{(o)}$)]. An element from a genset will be called a *genelement*.

The basic description $D^{(o)}$ left $œ^{(o)}$ as well as the geneses of the observables marks gk, bogged into the non-conceived and unspeakable. The minimal intrinsic meta-conceptualization G[($G^{(o)}$,$V^{(o)}$)] draw them into the conceived and communicable : a huge leap.

A genelement from a genset cannot be considered to clearly *belong* to this genset : it does not entirely *pre*-exist iside it. It possesses there three mutually distinct *modalities* of existence that come ino being *successively*. It is first only abstractly and prospectively distinguishable inside $œ^{(o)}$ as a relative *potentiality*. Then this potentiality undergoes a *process of actualization* whereby the previous potential whole labeled $œ^{(o)}$ is - entirely - *consumed*. And finally the observable end labeled gk of this process of actualization emerges as a stably *actualized result* whereby the previous processual state of actualization also becomes *consumed*. So there is a *passage* that leads from a whole labeled $œ^{(o)}$, to this or that *one* among all the observable ends gk first only abstractly and prospectively distinguished inside $œ^{(o)}$; *a passage that brings into play the whole depth of the Kantian modal dimension that goes from potentiality to actuality* (refs. 5, 7) while it also shrinks down the potential whole labeled $œ^{(o)}$, into *this* or *that* individual, actualized, phenomenal manifestation labeled gk. So speaking *uniformly* of all these successive stages in terms of an "element" that "belongs" to the genset would amount to an *a posteriri* simplification whereby the differences between the successive modalities of being are occulted and instead a fictitious present whole is suggested : a sort of surreptitious geometrization harbored by the word genesis. While in *fact* these temporal and modal characters subsist in the sense that they *dictate their own specific logical and probabilistic laws* (refs. 7, 14) as it appears below.

As far as I can see the new type of set called here a genset has never before been conceived of and studied in *general* terms, neither in mathematics nor in logic. Peano's definition of the infinite set N of integers is also "genetic" but in another sense. Only physics - only microphysics in fact - because of the maximally severe constraints imposed there upon the creation of knowledge, could bring forth the explicit recognition of the necessity - at the limit of an exhaustive representation of the very first phase of a chain of conceptualization - to accomplish separately *two mutually INDEPENDENT* epistemic operations, first an operation of generation of an unknown object-entity, and then a subsequent operation of qualification of this object-entity (which leads to the concept of genset). In mathematics the connections with pure factuality are much too remote to bring this into evidence. Furthermore, once recognized, this two-steps structure of a basic transferred description had to also be worked out into a fully general and explicit concept.

Before continuing with general assertions, let us examine first the *space-time representation* of simple example.

FIG. 1 : Representation of the *space-time structure* of a simple genset G[($G^{(o)}$,$V^{(o)}$)]
(ATTENTION ! These notations are wrong. See the manuscript)

The figure 1 - via an example - represents all the main features of the space-time structure of a genset. The example refers to a particular case where the basic view $V^{(o)}$ contains some number n of basic aspect-views $V_g^{(o)}$ that fall apart into a partition containing only three sub-sets of *mutually compatible* aspect-views (P10 and ? 11).

Now - (see P10, and also ?11 but read *per a contrario*) - the examinations corresponding to a set $\{V_{gj}^{(o)}, j=1,2,...m\}$ of m mutually compatible basic aspect-views $V_{gj}^{(o)}$, can always be all *simultaneously* carried out on *one* replica of the considered basic object-entity $œ^{(o)}$, by making use of *one* conveniently conceived *common* device that yields as result *one* configuration of observable marks : from this unique configuration of observable marks one can *afterwards* derive, by further, abstract manipulations, m distinct corresponding *interpretations* of the configuration, in terms of this or that aspect-value $(gk)_j$, j=1,2,...m of a definite aspect-view $V_{gj}^{(o)}$ from $\{V_{gj}^{(o)}, j=1,2,...m\}$. This can be achieved by application upon the unique factual configuration of observable marks, of the qualitative or mathematical *coding rules* of a factual result, rules necessarily involved by the conceptual definitions of the basic aspect-views $V_{gj}^{(o)}$ and by the theory used (in short, the mutual differences between the values $(gk)_j$, j=1,2,...m of the mutually compatible basic aspect-views $V_{gj}^{(o)}$ stem exclusively from the way in which the factual result produced by an $V_{gj}^{(o)}$-examination is translated in terms of a $(gk)_j$-value).

Furthermore, in a space-time representation of the genelements from a genset, accordingly to the minimal intrinsic meta-conceptualization of $D^{(o)}$, $[MIN.D_I^{(1)}]$, the space-time domain ?x?t required by a realization of $G^{(o)}$ - so of a replica of $œ^{(o)}$ - is the *same* for all the pairs $[G^{(o)},V_g^{(o)}]$ with $V_g^{(o)}$ a basic view from $V^{(o)}$. And - by construction of the minimal intrinsic model $[MIN.\ IM(œ^{(o)})]$ corresponding to $[MIN.D_I^{(1)}]$ - the monolith of as yet non expressed and unknown but physically determined potentialities labeled $œ^{(o)}$ is located inside this common space-time domain (namely on the limiting space-time domain $?\mathbf{r}.t_o$). Whereas mutually *incompatible* $V_g^{(o)}$-examinations cover *distinct* space-time domains (P10, ?11). So the structure of *a space-time representation of a genset is tree-like*, with a *common trunk* covering the space-time domain $?\mathbf{r}.?t$ and a number of distinct *branches* - let us denote them b, b=1,2...n, equal to the number of sub-sets of mutually compatible aspect-views contained in $V^{(o)}$.

Coming back now to the example from fig.1, there only one space-dimension is represented, so $?\mathbf{r}.?t$ and $?\mathbf{r}.t_o$ becomes respectively $?x.?t$ and $?x.t_o$, and n=3 so we have b=1,2,3. Let us denote $\{V_{gj}^{(o)}\}_b$ the set of mutually compatible aspect-views from the branch b, and m(b) the cardinal of $\{V_{gj}^{(o)}\}_b$. We have j=1,2,...m(b) and $?\ _b m(b)=n$. The unique device corresponding to $\{V_{gj}^{(o)}\}_b$ will be called b-device and an examination and it will be considered to define a corresponding basic aspect-view $V_b^{(o)}$, so it will be denoted $V_b^{(o)}$-examination. The unique configuration of marks produced by a $V_b^{(o)}$-examination will be called a b-qualification. So the genset from fig.1 involves in fact only sorts of pairs **[**(one operation $G^{(o)}$ of generation of a replica of $œ^{(o)}$), (one $V_g^{(o)}$-examination of that replica of $œ^{(o)}$)**]** that can be denoted, in short, $[G^{(o)},V_b^{(o)}]$, b=1,2,3. The three different branch-examinations from fig1 begin all at the same time t_o when the operation of generation of $œ^{(o)}$ finishes (with respect to the re-established origin of times). But each branch-examination finishes at a specific time t_b. Each branch-examination is a process of actualization of a part of the potentialities of observable manifestations that can be drawn from $œ^{(o)}$, namely that part which is relative to that b-examination (so also to all the basic aspect views $V_g^{(o)}$ from $\{V_g^{(o)}\}_b$). In contradistinction to the process of generation of the basic object-entity $œ^{(o)}$ - that is relative to the operation of generation $G^{(o)}$ alone - a process of actualization of a b-qualification of $œ^{(o)}$ is relative to both operations $G^{(o)}$ and $V_b^{(o)}$-examination.

Upon repetitions of the pair $[G^{(o)},V_b^{(o)}]$ the set of all the phenomenal b-qualifications brought forth on the top of a given branch - in general *different* from one another (?12, ?13) - can be regarded as

constituting a purely factual *basic b-description* $D_b^{(o)}/G^{(o)},œ^{(o)},V_b^{(o)}/$ of $œ^{(o)}$ realized along the "b-direction of examination" : a b-description of $œ^{(o)}$ can be regarded as a purely factual actualizing projection upon the level of the observable, of the b-relative potentialities from the monolith of potentialities introduced by the minimal intrinsic model of what has been labeled $œ^{(o)}$. Each such phenomenalized purely factual b-projection $D_b^{(o)}/G^{(o)},œ^{(o)},V_b^{(o)}/$, can then be translated in all the m(b) more conceptualized and analyzed languages offered by the $(gk)_j$-values, j=1,2,...m(b) of the m(b) distinct basic aspect-views from $\{V_{gj}^{(o)}\}_b$. This yields the part of the basic description $D^{(o)}/G^{(o)},œ^{(o)},V^{(o)}/$ (D14.3.1) that corresponds to only the basic aspect-views tied with the considered $V_b^{(o)}$-examination.

The integral basic description $D^{(o)}/G^{(o)},œ^{(o)},V^{(o)}/$ corresponding to the epistemic referential from fig.1 consists of the set of all the actualized gk-qualifications drawn, accordingly to gk-codes, from all the three purely factual phenomenal b-qualifications obtained along all the three branches of $G[(G^{(o)},V^{(o)})]$. While the genset $G[(G^{(o)},V^{(o)})]$ itself consists of all the *genelements* involved in the minimal intrinsic meta-conceptualization $[MIN.D^{(1)}]$ of $D^{(o)}/G^{(o)},œ^{(o)},V^{(o)}/$. Each genelement from $G[(G^{(o)},V^{(o)})]$ covers - in succession - the whole Kantian modal dimension potential-actualizing-actualized, and is closed by a *conceptualization* of an actualized b-qualification, in terms of some value gk of some basic aspect-view.

The preceding comment of the example from fig.1 will now permit to understand clearly the following final general considerations.
The mathematical theory of the gensets remains to be elaborated. What operations can be defined between the genelements of a given genset (internal calculus) ? What a sort of calculus do obey two or more gensets considered *globally* (external calculus) ? What are the relations between the set theory and the genset theory ? What are the specific conceptual consequences of the genset theory ?
From the start on one can assert this :

> The mathematical genset-theory will bring forth a deep non-classical unification between sets (so mathematics), logic and probabilities. Indeed :

- Consider first the *probabilistic* point of view. The branch-descriptions from the tops of the branches of a genset are a *classical* set of phenomenal b-qualifications (convertible in distinct sets of gk_j-qualifications, j=1,2...m(b)). This classical set, if completed with a Boolean algebra defined on it, yields a classical probabilizable space. If a probability measure is then defined on this algebra, a classical Kolmogorovian probability space is obtained. In this way - since it contains in general several branches - a genset $G[(G^{(o)},V^{(o)})]$ yields a *probability tree* (refs. 6,8,10,14) where the classical probability spaces from the tops of the different branches certainly are *connected* with each other, they are "dependent" on each other, *because they stem from a unique trunk that holds a unique sort of basic object-entity* $œ^{(o)}$.

> But *a dependence of this kind TRANSGRESSES the classical Kolmogorovian probabilistic dependence*.

A classical probabilistic dependence is always defined inside *one* probability space and it concerns isolated events from the algebra of that space. So *a fortiori* it is also confined inside only one branch, and concerns explicitly only elements from the horizontal *top* of the branch (the confinement inside one branch holds also for the classical concept of "probabilistic correlation").
Whereas the probabilistic dependence involving the *whole* probability spaces from two different branches, reflects what can be regarded as a "semantical degree of similitude" somehow determined by the "angle" between the two corresponding "b-directions of examination" started from the common trunk where the intrinsic minimal model of $œ^{(o)}$ is lodged. With respect to the classical concept of probabilistic dependence, such a semantical degree of similitude between whole probability spaces is a

concept of probabilistic *meta*-dependence. (The first example of a mathematical expression of a probabilistic meta-dependence of this kind can be found in the quantum mechanical formalism, namely in Dirac's "theory of transformations" (refs. 6,7,14) ; but the general significance of Dirac's algorithm remained entirely hidden. The MRC-concept of genset explicates it in *generalized* terms.
The above remarks specifed - superficially - in what a sense the concept of genset leads to a deepening *and* extension of the classical theory of probabilities and of its relations to set theory.

Consider now the *logical* point of view. This brings forth a novelty that stays in polar opposition to that produced by the probabilistic point of view. The main probabilistic novelty tied with the concept of genset extends the classical theory of probabilities in the direction of a *higher* degree of statisticity, since it compares probabilistically two or more whole probability spaces (ref.8). Whereas the logical novelty tied with the concept of genset draws attention upon an extreme and paradoxical form of "logical dependence" - namely *mutual exclusion* - which is entailed by the *strict absence of statisticity*, by *STRICT INDIVIDUALITY* : *iff* a restriction to only *one REPLICA* of $\text{œ}^{(o)}$ is posited - not only restriction to no matter how many replicas of *one SORT* of basic object-entity $\text{œ}^{(o)}$ as defined by a given operation $G^{(o)}$, but furthermore restriction also to only one replica of that sort of basic object-entity -, *then* there arises ***(a)*** a problem of *a priori CHOICE* between *EITHER* the actualization, from this one replica of $\text{œ}^{(o)}$, of a qualification on the top of *this* branch of the genset stemming from it, *OR* the actualization from it of a qualification on the top of *another* branch ; and ***(b)*** a problem of mutual (*a posteriori*) exclusion between also any two distinct b-qualifications from the top of *one* branch, so between also two *a priori* mutually *compatible* qualifications. It follows (P10, ? 11) that :

> A logical conjunction of two distinct b-qualifications, is *devoid of factual counterpart* if they concern the same replica of an object-entity $\text{œ}^{(o)}$. Therefrom follows a non-classical logical structure rooted in strict individuality and tied with the passages that lead from potentialities of qualification, to actualized qualifications : the logic of genelements and that of fragments of genelements is different from the logic of the elements from a classical set.

But as soon as two or more replicas of a given object-entity are allowed (hence *a fortiori* also if two or more sorts of object-entities are allowed) these kinds of mutual exclusion vanish and a factual counterpart *can* be defined for the logical conjunction of any two genelements. But then one finds oneself already in the realm of statistics, of "Boolean" logic, so of the algebras from the classical probability spaces. *This* is the usually so fuzzily understood core of what is called "quantum logic", reflected there in such a truncated, intricated and fallacious fashion (refs. 7,14) :

> The classical Boolean logic is *statistical* : *THE ASSERTION OF A NON RESTRICTED POSSIBILITY OF LOGICAL CONJUNCTION PRESUPPOSES STATISTICITY*, it overlooks the specificities of strict individuality ; it *begins* above the level of strict individuality and then floats over it, loose and dead, cut away from its roots that are fixed in strict factual individuality.

MRC, *via* the concept of genset, brings explicitly into evidence a strictly individual level of the logical conceptualization, essentially tied with the constraints that act along the potential-actualizing-actualized modal dimension which leads from a basic object-entity $\text{œ}^{(o)}$, to its observable qualifications. This individual level of the logical conceptualization, with its own specific structure, remained entirely hidden so far. While precisely this level *founds BOTH* classical logic and classical probabilities, connecting them inside the elementary, primary routes that lead from pure a-conceptual factuality, to knowledge.

> The concept of genset leads toward a non-classical unification between logic and probabilities. Which in its turn - in so far that mathematics as a whole can be derived from the concept of set - is imbedded into a wider unification between logic and mathematics.

Finally the dream of Cantor and Russell (and of so many other major thinkers) of a unification of logic and mathematics, might come true. But in a *processual* form that starts at the local, purely factual and

strictly individual origin of this or that chain of conceptualization, and then involves the whole Kantian modal dimension that leads from potentiality to phenomena. Only quantum mechanics has been able to offer a first pale and flickering glimpse on such a sort of unification. MRC stabilizes and amplifies the perception of these local zero-points of the chains of conceptualization, and incorporates explicitly their unifying consequences, in the concept of genset.

To sum up : At the bottom of the chains of conceptualization, the gensets knit together - by physical operations - physical factuality and communicable knowledge. They first create out of the depths of pure factuality, a specified bulk of non-conceptualized *BEING* (J. B. Grize, in a comment on this work, called this «une "motte" de *quid*, sémantisable mais encore non-sémantisée» [16]) and then, out of this bulk, they draw observable manifestations which, *via* an adequate coding, can be incorporated into language-and-knowledge. They do all this incessantly, though mute and ignored. Thereby the gensets are the daily defeators of the impossibility - with mere words - to really *grasp* being (Aristotle's *ens*, Spinoza's substance, Kant's thing in itself, Heidegger's triad *Seiende-Dasein-Sein*, Wittgenstein's *unspeakable*), or even to only insure that the surface of Being is *touched*, that we do not float far above it in the fluid conceptual substance that surrounds the nets of words.

> The classical concept of set can be regarded as a sort of projection of the concept of genset onto a vault, onto a covering meta-surface. A projection that shrinks "*all* " the potentialities from $\text{œ}^{(o)}$, simultaneously, onto the final level of the actualized, smuggling away the pecularities of strict individuality as well as the initial status of mere potentiality and the subsequent processes of actualization with their non removable *relativity* to views. Time is thus eliminated and an absolutizing inductive totalization, a "geometrization" is performed, on a surreptitiously introduced meta-level of description. The "problem" of actualized infinities is intimately related with this kind of hidden conceptual leap. (G. Longo said [17] that : «the classical concept of set is "newtonian", a hypostatic concept chained to the thin upper stratum where only "technicalities of the superficiality" are at work»

A sort of only temporal residue of the concept of genset might be found to be relevant with respect to a basic transferred description of a psychical object-entity. Anyhow it is clear that the spatial restrictions from P8, P10, ? 11 do not apply.

D19.5. *Intrinsic Meta-Conceptualization of a Basic Transferred Probabilistic Description*. The construction of this concept requires first a thorough definition of a basic transferred probabilistic description (refs. 12,14) too complex to be exposed here (one finds a superficial indication in the relation mentioned above between a genset and the corresponding "probability tree"). But a systematic construction *can* be achieved inside MRC, which yields a deep non-classical foundation for the classical Kolmogorov probabilities.

Global remarks on the nucleus of MRC

MRC is : ***(a)*** *Explicitly founded upon the functioning of human mind, with its cognitive AIMS*. The choices of the epistemic referentials that generate the relativized descriptions, stem from the consciousness functioning of the acting observer-conceptor. Each such choice expresses a curiosity, a descriptional aim of a consciousness functioning. The descriptional aims expressed by the successive choices of an epistemic referential, inside a

[16] Grize, J.B., in a letter to the present author.
[17] Longo, G., remark during a session of the Center for the Synthesis of a Formal Epistemology.

chain of conceptualization, determine the "direction of conceptualization" step by step. ***(b)*** *EXPLICITLY ROOTED IN PURE FACTUALITY*, which entails a systematic and constructed distinctionn between *potentiality* of an infinity of possible relative actualizations of observable manifestations, and this or that *actualized* observable manifestation, which entails the new logico-mathematical concept of genset. ***(c)*** *RADICALLY RELATIVIZING*, in consequence of (b). The whole approach bears the seal of the mutual relativities between object-entities and views (or, equivalently, between generators of object-entity and views) and of the relativities of descriptions to the triads $G,œ_G,V$. ***(d)*** *Méthodological, normative, legalizing*. It is not an attempt at describing the natural processes of conceptualization. Though MRC takes strongly into account data (introspective, linguistic, etc.) concerning these natural processes, it nevertheless deliberately takes distance with respect to them, by the choice of definitions and principles specifically adapted for *optimizing* the conceptualization in compatibility with definite goals : elimination of any false absolutization, reflexivity, construction of a net of reference with respect to which it be possible to "localize" any natural descriptional structure, etc. ***(e)*** *Finitistic, cellular, local*. The fact that the construction of knowledge requires parcellation, steps, is taken into account quite fundamentally throughout MRC. ***(f)*** *Hierarchical*. But generating *hierarchical TRAJECTORIES* of conceptualization, in contradistinction to the theory of logical types or that of levels of language which introduce extended hierarchical *strata*. ***(g)*** *Directional and reflexive, endowed with a capacity for an a priori-a posteriori DOUBLE WAY progression*. Before starting a given descriptional cell, a free choice of the direction of conceptualization desired by the observer-conceptor is expressed in a corresponding choice of an epistemic referential. The results of this choice can later be rejected or kept and developed, on the basis of explicitly defined criteria. ***(h)*** *Globally UNLIMITED*. Everywhere there are *local* delimitations of the descriptional quest, but globally nowhere a boundary is pre-imposed : *the finalized finitism of MRC generates infinities, and also can analyze them.*

The various enumerated features are by no means mutually independent, quite on the contrary, beneath language they all stem from one core-structure that induces an innumerable host of connections between these verbally separated features. This core-structure is dominated by the systematically recurrent role of the consciousness functioning which introduces the epistemic referentials. Once an epistemic referential has been chosen, the generator of object-entity and the view from it entail corresponding non removable descriptional relativities. The whole hierarchy of distinct descriptional levels from each chain of conceptualization obeys the *same* dynamical law of normed conceptualization. In this sense all the - relativized and local - passages from a level to a meta-level (with respect to the previous one), express as much definite connections, as they also express definite cuts.

And the whole configuration is nurtured with semantical substance via the fundamentally new construct of genset of a basic transferred description.

But to what class of conceptual beings does MRC belong ? In what terms can the abstract structure of this representation be characterized ?

One can immediately state that MRC is *not* reducible to a "logic", if by logic one means specifically the study of truth-valuations, formal consistency, completeness. Indeed MRC starts far *beneath* logic in this sense and it concerns *any* sort of conceptualization. Furthermore MRC certainly is not conceivable either as what is called "a pure statement of facts", whatever meaning such an expression might be assigned. It is a method, tied with aims - namely descriptional aims - while finality is exterior to nowadays logic and mathematics. And this method is quite essentially tied also with semantics. So the formal structure that one feels to be hidden in MRC can only be researched as a *meta* -syntax of indelibly interwoven syntaxical and semantical features :

MRC is a method for starting - out of meaningless factuality - the construction of normed chains of cellular meanings, of cellular pieces of sense, and for freely combining and developing these chains of cellular meanings, indefinitely and reflexively, into systems of pieces of meaning of any kind, in particular also logic and theories [18].

The typology of relative descriptions generated by MRC (cf. refs. 1B and 7) *incorporates* progressively the various descriptions of logical type (the logic of classes, of propositions, of predicates, the problems concerning consistency and completeness) while is constructed the hierarchical chain of meta-levels where the object-entities and the views that generate these logical descriptions ((the meta-view of factual truth first, then those of formal truth, of decidability on formal consistency, and of completeness) can meaningfully be defined. The fact that throughout the process of constructing MRC one *acts* logically, is not a circularity. It illustrates the general reflexive, *a priori-a posteriori* character of any approach and in particular of this one : *a priori* the logical criteria are supposed to be fulfilled and they are utilized implicitly (as, for instance, was implicitly presupposed the possibility of any pairing (G,V)) ; then, at a convenient level of development of the approach, the logical criteria become *a posteriori* explicitly expressible in MRC-terms (as it happened for the *a posteriori* criteria concerning the relevance of the pairing (G,V), namely first the criterion of mutual existence D7, and then the subsequent criterion of stability involved in the definition D14.1). If MRC finally appeared not to satisfy the explicit *a posteriori* criteria for logical acceptability

[18] The "natural logic" developed by J.B. Grize is the sort of logic that seems the nearest to MRC.

generated inside itself, the whole approach should be regarded as self-contradictory, and canceled. But this does not happen, so MRC *can* be kept.

> Finally, since in fact any "theory" is normative, never purely descriptional as the classical myth on objectivity involves, MRC could best be regarded as an attempt at *a finitistic theory of the natural processes generation of meaning* where both relativism and false absolutizations are excluded *ab initio* by explicit rooting into pure factuality and by systematic relativizations.

As already pointed out several times, the primordial novelty introduced by MRC stems from fundamental quantum mechanics and consists of the concept of basic transferred description (D.14.3.1 and D.14.3.2) that specifies and norms in quite explicit and general terms the structure of the *passages* from the realm of pure factuality, of unexpressed Being, into the realm of communicable inter-subjective knowledge. Thereby MRC *transgresses* quantum mechanics where such passages are *implicit* in the descriptions of a *particular* class of object-entities.

> MRC specifies and norms in explicit and general terms the structure of the very first step in the construction of objectivity. It wrenches this first step out of the amputating trap of language where ancestral circularities vitiate it, and it roots this step beneath language, into the deeper level where the intakes of fragments of factuality adduce the hard core of objectivity : a-(conceptual-linguistic) samples of that on what the inter-subjective consensuses are founded, in science. These are what is then worked out in communicable terms and infused into language.

Does MRC create a conceptual volume large enough in order to be able to lodge in it *any* sort of conceptualization ? This, of course, cannot be asserted *a priori*. Anyhow a start has been made.

Now, should MRC be formalized ? Could it be formalized ?

The second stage : an ideographical symbolization

In all the expositions of MRC that preceded the present one I *included* in a presentation made in usual language, an ideographic symbolization which - without being a mathematical representation - permits certain suggestive and economic expressions. In this work I present it separately. In this way, the symbolizations remain available, while the drawbacks as well as the advantages appear clearly.

- A *consciousness functioning* CF is represented by the sign suggesting the whirling place from D1 that acts on both the Exterior Universe and the Interior Universe where it belongs, and in particular also on itself.

- *Reality* is again symbolized by the letter R.

- A *generator G of object-entity* will be represented by the sign ë and will be *re-named* a *delimitator* of object-entity, in order to stress that - whatever the nature of G - the final result is a delimitation, out of R, of a corresponding object-entity. Thereby however one *looses* the accent placed before upon the (possibly) of a *radically creative* character of an operation of object-entity generation : this should be kept in mind. Then :

- The"place" from R where ë works will then be denoted $R_{ë}$.

- The object-entity produced by ë will be denoted by $œ_{ë}$.

- The *process of delimitation* by ë, of an object-entity $œ_{ë}$, will be represented - indifferently - by

$$ëR_{ë}?œ_{ë} \quad \text{or} \quad œ_{ë}?ëR_{ë}$$

where the two arrows have *not* a logical meaning and cannot be considered separately, they are cemented into to the global symbolizations which read respectively : "the delimitator ë, acting on R at the place $R_{ë}$, produces the object-entity $œ_{ë}$", and "the object-entity $œ_{ë}$ produced by the delimitator ë that acts on R at the place $R_{ë}$".

Notice that the introduction of these symbolization permits to *distinguish* between
ë : an epistemic operat*or* (in the sense of usual language, *not of mathematics*) ;
$ëR_{ë}$: an operat*ion* ;
$ëR_{ë}?œ_{ë}$: *a process, that mentions its beginning and its result* ;
$œ_{ë}?ëR_{ë}$: *an explicit specification of an object-entity via the process that produced it*.
Thereby the expressivity concerning this zone from MRC is considerably increased.

- An *aspect-view* V_g will be symbolized by ^ ;
- The *operation of examination of $œ_{ë}$ by* ^ will be represented by

$$^œ_{ë}$$

Notice that the introduction of these symbols permits to *distinguish* between the epistemic operat*or* ^ (in the sense of usual language, not of mathematics), and the operat*ion* of examination $^œ_{ë}$. Which is an increase of expressivity.

- A *view* will be symbolized by #.
- The - global - *operation of examination of $œ_{ë}$, by #* (achieved accordingly to ?11), will be represented by

$$#œ_{ë}$$

The remarks concerning ^ hold also concerning #.

- The representation of an *epistemic referential* (G, V) becomes (ë,#).
- The representation of an observer-conceptor [CF,(G, V)] becomes [, (ë,#)].
- The *mutual inexistence* between an object-entity $œ_ë$ and a view V will be symbolized by

$$œ_ë/\#\quad \text{or}\quad \#/œ_ë$$

which reads, respectively, "the object-entity $œ_ë$ does not exist with respect to the view #", "the view # does not exist with respect to the object-entity $œ_ë$".

- The *mutual existence* between an object-entity $œ_ë$ and a view # will be represented by

$$œ_ë/\#\quad \text{or}\quad \#/œ_ë$$

which reads "the object-entity $œ_ë$ does exist with respect to the view #", "the view # does exist with respect to the object-entity $œ_ë$". (All these symbolizations can also be used, in particular, with the symbol of an aspect-view ^ instead of #, which changes the meaning correspondingly).

- The representation of a *space-time view* V_{ET} becomes &.
- The *frame-principle* can be symbolized in the following way :

$$[œ_ë/\hat{}] \;?\; ?[\& : œ_ë/\&V\hat{}]$$
$$[œ_ë/\&]\,, \quad ?\,\&,\; ?\,œ_ë$$
$$[ë : ëR_ë ?\; ?(œ_ëä\&)]$$

(where : the arrow - quite independently of any connotation suggesting *formal* logic - reads "entails that" (in the sense of usual language or of "natural logic" in the sense of J.B. Grize) ; and - - outside any *formal* system, just in the sense of usual language or of "natural logic" - read, respectively, "there exists" and "there does not exist" ; &V^ - considered as a one-block symbol - reads "the view formed with a space-time view & and another *physical* aspect-view ^". The global reading of this symbolic picture is the verbal formulation of P8.

- The symbol of a *relative description* D/G,$œ_G$,V/ becomes D/ë,$œ_ë$,#/. Then a *basic relative description* $D^{(o)}/G^{(o)},œ_G{}^{(o)},V^{(o)}/$ is symbolized by $D^{(o)}/ë^{(o)},œ_ë{}^{(o)},\#^{(o)}/$, and a relative meta-description of order n, $D^{(n)}/G^{(n)},œ_G{}^{(n)},V^{(n)}/$, n=0,1,2,...., is symbolized by $D^{(n)}/ë^{(n)},œ_ë{}^{(n)},\#^{(n)}/$.

Together, these symbolizations constitute "*the ideographic representation [, ë, $œ_ë$, #, ($D^{(n)}$, n=0,1,...)] of MRC*".

The third stage : a first most general scheme of a mathematical representation

The verbal formulation of MRC conveys a methodology by which the activity of constructing knowledge, though it is exposed with the help of words, nevertheless is extracted from *mere* language. The above ideographic symbolization increases the degree of this extraction. But in order to achieve the liberation it seems important to achieve now a mathematization. Indeed current language inextricably incorporates hosts of surreptitious false absolutizations, of insidious obscurities, a pullulation of sonorities and implications that arouse unpredictable philosophical suspicions, refusals, passions. Furthermore, it is devoid of a clearly defined, formalized structure. Obviously, an ideographic symbolization cannot remedy to all that. Whereas a transposition of the definitions and principles which form the nucleus of MRC, in *mathematical* terms, would re-produce the essence of MRC in an unambiguously defined, synthetic, purified and neutralized form. It would also open up the possibility of calculatory treatments.

On the other hand, the full content conveyed by the verbal presentation should be kept in mind : it points *best* toward this wealth of the individual conceptual being symbolized «MRC» which - like any strictly singular designatum - escapes *any* sort of language, but, if touched and grasped by the mind in prolongation of a "direction" of thought well materialized by associations of words from current language, acts as a guide and a fertilizer of the process of understanding.

Preliminary summarizing

The first target of a mathematical expression is a re-expression of the skeleton of the nucleus of MRC. So we begin by extracting this skeleton.

Imagine a consciousness functioning CF in interaction with the reality R.

- This interaction induces inside CF epistemic *aims* that generate there corresponding epistemic referentials, i.e. *a priori* non restricted pairings (G,V_g) or (G,V).

- The epistemic aim synthesized by (G,V_g) (or (G,V)) leads to an epistemic *action* of G upon the corresponding "spot" R_G from R, that generates out of R the object-entity $œ_G$, thereby contributing to the content of an *evolving* set of object-entities.

- Consider now the definition D7 of *mutual existence of G and* V_g (or V). If G and V_g (or V) do not mutually exist in the sense of D7, then the *a priori* pairing (G,V_g) or (G,V) must be *a posteriori* dismissed ; but if G and V_g (or V) *do* not mutually exist in the sense of D7, then the action of V_g (or V), upon $œ_G$ - to be accomplished accordingly to the principles P8 and P10 and to the proposition ?11 - produces observable results.

- Concerning these results consider now the condition of *stability* from D.14.1 (see also ?12 and ?13). If this condition does not obtain, neither on the individual level of description nor on the probabilistic one, then the *a priori* pairing (G,V_g) or (G,V) must be *a posteriori* dismissed, eventhough it has resisted the test of mutual existence. But if the condition of stability does obtain either on the individual level of description or on the probabilistic one, then hierarchical chains of relative descriptions $D^{(n)}/G^{(n)},œ_G^{(n)},V^{(n)}/$, n=0,1,2,..., can be constructed, which enrich the content of an *evolving* set of relative descriptions.

- Physical epistemic operations G and V_g are subjected to the principles P8 and P10. This entails *constraints* that are - partially - expressed by the proposition ?11 and the space-time structure of the concept of genset of a basic transferred description of a physical object-entity.

This is the whole essence of the skeleton of MRC.

Mathematical framework

We seek now a mathematical representation of the skeleton of MRC. It is crucial to begin by making use of the weakest possible mathematical structure, i.e. which introduces a minimum of formal restrictions not stemming from MRC. Only in this way can it be hoped to avoid a too amputating transposition of the content of the verbal presentation. Later it will be useful to specify *local* restrictions in order to characterize particular types of MRC-conceptualizations (probabilistic, logical, this or that sort of theory). But the general framework has to be maximally comprehensive. No pre-existing mathematical structure, I

think, can yield a fully satisfactory formal expression of MRC. This is so because of the very peculiar character of the basic descriptions (D14.3.1 and D14.3.2) which introduce explicitly into the representation the distinction between potential and actualized features of an object-entiy. But the theory of categories seems to be a good candidate for just a start. So we remind of just the basic definitions from the theory of categories.

Consider the concept of category (Encyclopedia Universalis Vol. 3, France S.A. 1976, p. 1057) (my translation, where also the notations are correspondingly translated : instead of Fl (flèche) we write Ar (arrow), etc. ; these notations, of course, can be optimized later) :

«A category C consists of the specification of :

a) a class Ob(C) of *objects*, and a class Ar(C) of *arrows* ;

b) two applications s and t from Ar(C) into Ob(C) (for any pair (A,B) of objects one denotes by Hom(A,B) the class of arrows f having the *source* s(f)=A and the *target* t(f)=B ; if f? Hom(A,B) one writes f : A? B, or A? B :

c) an application that associates to any pair (g,f) of *composable* arrows, i.e. such that s(g)=t(f), a *composed* arrow denoted g of or gf, with source s(f) and target t(f).

The concepts thus defined being subjected to the two following axioms :

(C.1) For any object A there exists a unit arrow 1_A : A? A such that $1_A$of=f and g$\circ 1_A$=g, for any arrow f with target A and any arrow g with source A ;

(C.2) If f : A? B, g : B? C and h : C? D, then (hg)f =h(gf).....

The mathematical structures (sets, groups, topological spaces, etc.) are usually endowed with morphisms (applications, homomorphisms, continuous applications, etc.) and they determine categories (Set, Top., etc.) whose objects are the structured sets and whose arrows are the morphisms ; the source and the target of a morphism are here, respectively, the starting set and the arrival set of the morphism. One immediately obtains categories that are not of the preceding type *via* formal constructions like the following ones : if C_1 and C_2 are two categories, the product category $C_1 x C_2$ has as objects the pairs formed with an object from C_1 and an object from C_2, the arrows with source (A_1,A_2) and target (B_1,B_2) being the pairs (f_1,f_2) where f_1 : A_1? B_1 and f_2 : A_2? B_2. The dual category corresponding to a category C* is obtained by «reversing» the direction of the arrows from C.....

If C and C' are two categories, a functor F from C into C' associates to any object A from C an object F(A) from C', and to any arrow f : A? B, an arrow F(f) : F(A)? F(B) such that :

(F.1) for any object A from C, $F(1_A)=1_{F(A)}$.

(F.2) if (g,f) is composable in C, F(gf) = F(g)F(f)».

C_{MRC}

Preliminaries. We shall now try to represent the skeleton of MRC, in the terms of the theory of categories. So we shall introduce a category denoted $C_{MRC.}$ This is *not* attempted under the constraints of the theory of models. Indeed in consequence of the primordial role assigned in it to the consciousness functioning, MRC has a strongly *teleological* character. Furthermore, because the transferred descriptions root it into pure factuality, *beneath* language, MRC also has a basically *intensive* character, an actively created and relative intensive character. Whereas nowadays semantics takes its start *on* the level of languages and of classical logic, so *above* the assumption of pre-existing and absolute object-entities and predications, and its difficulties are well-known : an intensive semantics is not yet accomplished, even the relations to be required between extensive and intensive semantical features are still very obscure. As for pragmatics as a discipline incorporating teleology, it is still very incipient. It would be at the same time hopeless and *pointless* to try to submit *a priori* an approach like MRC, to requirements induced by other still non-stabilized approaches that start from languages and classical logic. On the contrary, it can be hoped that a free mathematical representation of MRC, as that one attempted below, if it succeeded, would help to build a deep-rooted and sound extensive-intensive pragmatical semantics.

Since C_{MRC} is attempted as a particular interpretation of the abstract concept of a category, the semantics associated with the involved objects and arrows will be given as much importance as the syntactical constraints imposed by the theory of categories.

$Ob(C_{MRC})$

The objects from $Ob(C_{MRC})$ are called *epistemic sites* (in short, sites) and are denoted S.

A site is posited to designate a definite sort of conceptual *ground* - just a semantical receptacle similar to an axis in a graphic representation, or, more generally, to a multidimensional representation space - available for lodging inside it *an EVOLVING and unlimited* content to which no general structure is pre-imposed (for the representation of particular MRC-problems one can pre-impose a particularly adequate structure). This content, however, is required to have a *nature* consistent with the general definition of the considered semantical receptacle (to "fit" into it, as, for instance, the red of this flower or the dark of this cat do fit into the semantical dimension labeled by the word "colour", but not into that labeled by the word "form"). The most important feature of the content of a site is that *it is NOT required as GIVEN from the*

start on (though it is permitted such) : in general it is conceived of as being created progressively and indefinitely.

The distinction itself between a stable pre-existing conceptual receptacle (a genus, an axis, a multidimensional conceptual space), and a corresponding sort of content of which any constituent or part can be indefinitely lodged inside this receptacle, at this or that definite "location" (specific difference, point), is by no means new. Quite on the contrary, more or less explicitly (it was quite explicit for Aristotle) it underlies the whole classical, linguistic, logical and mathematical organization, including also the basic notion of a *referential*. But neither classical logic nor nowadays mathematics do *represent* - in general and explicit terms - the most complete possible *process of generation of the content*, as it appears in a genset. And very often the content is tacitly supposed to somehow be entirely "given" from the start on, to somehow pre-exist all done, "out there", in a Platonic manner. Only if *ab initio* this hypostatic view is systematically replaced by a genetic one, will it be possible to mimic the fundamental MRC-concept of a genset, in the terms - of the theory of categories. Correlatively then, it should become possible to regard the concept of a set or that of a space in the mathematical sense, as an integration (sum) of *time-eliminating projections* of the temporal concept of a genset, onto the vault of actuality. (A "geometrization" of this sort, that recalls the procedures of general relativity, might somehow lead to the definition of an acceptable, general, mathematized bridge between potential and actual infinities).

The sites from $Ob(C_{MRC})$ are :

- S_R that represents formally the location of the evolving content of the reality R, as defined in D2 ;
- S_{CF} that represents formally the location of the evolving consciousness-functioning CF, as defined in D1.
- $S_{œ}$ where have to be located all the *formal representations* of the object-entities $œ_G$ defined in D4, as these emerge ;
- S_D where have to be located all the *formal representations* of the relative descriptions $D/G,œ_G,V/$ (def. D14.2) or meta-descriptions $D^{(n)}/G^{(n)},œ^{(n)},V^{(n)}/$, n=0,1,2,... (def. D16), as these emerge.

As already stressed, the explicit distinction between a permanent site determined by a static definition, and the (in general) evolving content located on this site, is quite essential for $Ob(C_{MRC})$.

Mind that ccording to MRC it is necessary to posit explicitly that S_R? ??$Ob(C_{MRC})$], which will induce *reflexive* features into the formalization [19].

In a further elaboration of particular MRC-problems, $S_{œ}$ and S_D will have to be assigned structures. $S_{œ}$ will have to become a *mathematical space* lodging in it an evolving content of mathematical beings (real or complex functions, kets, sequences of signs, etc.) - generated one by one and in general independently of one another - yielding a convenient representation of the considered sort of object-entities (in the particular case of the Hilbert-Dirac formulation of quantum mechanics $S_{œ}$ becomes the Hilbert space of state vectors). S_D will have to become another kind of mathematical space, lodging in it an evolving content of mathematical beings - again generated one by one and in general independently of one another - representing conveniently the considered type of achieved descriptions (in the case of quantum mechanics S_D consists of the column-matrixes that represent a state vector in a given basis). These spaces will have to be endowed with general structures such that the formal behaviour of the sub-sets tied with *physical* object-entities, when combined with the other elements of this mathematization, shall permit to reflect conveniently the space-time restrictions imposed by the principles P8 and P10, as well as the propositions ?11, ?12, ?13. Moreover the two structures posited on $S_{œ}$ and S_D will have to be connected with one another consistently from both a mathematical and a semantical point of view. In order to reflect formally this or that particular class of object-entities and/or of descriptions, further more specific structural rest rictions can be added.

$Ar(C_{MRC})$

Consider now the class of arrows, $Ar(C_{MRC})$. The arrows from this class will called *epistemic arrows*.

Given some category C, an arrow from Ar(C) is currently conceived to represent an already constituted morphism that pre-exists "out there" in a Platonic manner. This sort of semantics, however is not coherent with our previous definition of $Ob(C_{MRC})$ as containing sites with evolving content : it must be possible to conceive that the arrows from $Ar(C_{MRC})$ generate the evolving contents of the sites from $Ob(C_{MRC})$.

For consistency with the definition of $Ob(C_{MRC})$, any arrow from $Ar(C_{MRC})$ will be posited to represent a *process* of which the action is unlatched inside the source-site, at a definite "content-point" which in certain cases is itself *created* by that process as its own source-point; then the process develops in time (and sometimes in space-time) always ending by the *creation* at its head of a local contribution to the evolving content

[19] Matthieu Amiguet, in a private communication, has made interesting suggestions in this respect.

of the target-site. In this sense an C_{MRC}-arrow is posited as a - locally - *genetic arrow*, which will call in the concept of genset for achieving the formalization.

The epistemic arrows from $Ar(C_{MRC})$ themselves are imagined by the working consciousness functioning, in consequence of its interaction with the contents of S_R and with itself.So :

Though it does not belong to $Ob(C_{MRC})$, $Ar(C_{MRC})$ can be best described by making use again of the concept of site, a site bearing an evolving content of arrows.

$Ar(C_{MRC})$ can be split in two sub-classes of epistemic arrows, a sub-class of *primitive epistemic arrows* $PAr(C_{MRC})$, and a sub-class of *composed epistemic arrows* $CAr(C_{MRC})$.

$PAr(C_{MRC})$. The primitive epistemic arrows from $Ar(C_{MRC})$ are :

- *Data-arrows* d? denoted d, with $s(d)=S_R$ and $t(d)=S_{CF}$ (so belonging to $Hom(S_R,S_{CF})$), that represent the generation of data inside CF, by the influx of data from R.
- Endomorphic *aim-arrows*, of two kinds :
  - ***(Object-entity-generation-aim)-arrows** GA? (in short GA) with $s(GA)=S_{CF}$ and $t(GA)=S_{CF}$ (so belonging to $Hom(S_{CF},S_{CF})$, that represent the process of constitution inside CF of the aim to know specifically about a somehow pre-figured sort of object-entity labeled $œ_G$ (the index G indicates the sort of action envisaged in order to - later - generate effectively such an object-entity).
  - ***(Qualification-aim)-arrows** or, in short, *view-aim-arrows*, of two kinds, V_gA? or VA? , indistinctly short-noted VA, with $s(VA)=S_{CF}$ and $t(VA)=S_{CF}$ (so again belonging to $Hom(S_{CF},S_{CF})$, that represent the process of constitution inside CF of the aim to qualify (some object-entity) *via* an aspect-view V_g or, respectively, a view V.
- *Operational-arrows* of two kinds :
  - ***(Object-generation)-operational-arrows** or, in short, *generation-arrows* G? (in short G) that represent the epistemic operations of *effective* generation of an object-entity. By definition $s(G)=S_R$ and $t(G)=S_{œ}$, so G? belongs to $Hom(S_R,S_{œ})$.
  - ***Qualification-operational-arrows** of two kinds, *aspect-view arrows* V_g? or *view-arrows* V? , indistinctly called *view-arrows* (in short V), with $s(V)=S_{œ}$ and $t(V)=S_D$ (so belonging to $Hom(S_{œ},S_D)$). The view-arrows represent the elaboration of relative descriptions by operations of qualification of an object-entity *via*, respectively, examination by an aspect-view or a view. Mind that a view-arrow V? represents *globally* all the processes of examination that establish the *one* corresponding relative description, so it has to be *constructed* from aspect-view-arrows V_g? by taking into account the proposition ?11.

- *Aim-activating-arrows* Aa? (in short Aa) of three kinds, that represent the passage - decided by the working consciousness functioning - from a given epistemic *aim*, to the corresponding effective epistemic *operation* :

  **(Generation-aim)-activating-arrows* GAa? (in short GAa) with $s(GAa)=S_{CF}$ and $t(GAa)=S_R$, so GAa? belongs to $Hom(S_{CF},S_R)$;

  **(View-aim)-activating-arrows* VAa? (in short VAa) with $s(VAa)=S_{CF}$ and $t(VAa)=S_{œ}$, so VAa? belongs to $Hom(S_{CF},S_{œ})$) ;

  **(Descriptional-aim)-activating-arrows* DAa? (in short DAa), that just initiate *globally* the whole descriptional program involved in the choice of an epistemic referential. (An arrow DA? itself - a descriptional-aim-arrow - is a *composed* arrow and as such it will be defined below. Nevertheless the corresponding aim-*activating*-arrow DAa? is a monolithic primitive arrow with $s(DAa)=S_{CF}$ and $t(DAa)=S_R$, so DAa? belongs to $Hom(S_{CF},S_D)$).

- *The unit-arrows* required for each site from C_{MRC} by the theory of categories could be introduced as purely formal arrows. However it is obvious that a fully satisfactory MRC-interpretation of the theory of categories should endow each unit-arrow, with an adequate semantics. This might be possible but it might involve quite non trivial epistemological considerations. It might even lead to certain deep and rigorous explicitations concerning the reflexive features to be assigned to the sites from C_{MRC}. (For S_{CF} the role of unit-arrow could be assigned to each one of the already defined endomorphic aim-arrows, which arises a problem of choice). So, for the moment, we leave open the question of unit arrows.

Before continuing with the sub-class of composed epistemic arrows, let us note the following. An epistemic referential (G,V) as defined in D6 can be now represented formally by the corresponding pair of operational arrows (G? ,V?). In order to represent formally the *a priori* possibility of any MRC-pairing (G,V), inside C_{MRC} any pairing (G? ,V?) will be permitted *a priori*. An observer-conceptor as defined in D6 can then be represented inside C_{MRC} by the association [CF, (G? ,V?)] between the evolving content CF of a site S_{CF} and the representation of an epistemic referential.

$C_{Ar(C_{MRC})}$. The composed epistemic arrows from $Ar(C_{MRC})$ are :

- Given two aim-arrows GA? and VA? - whatever they be - they are always composable in any order, since $s(GA?)=t(QA?)=s(GA?)=t(VA?)=S_{CF}$. However the MRC-semantics requires to take into consideration only the order GA? oVA? . So, denoting the result DA? (in short DA), we write

$$DA = DA? \; ?= GA? \; oVA?$$

with $s(DA)=t(DA)=S_{CF}$.

This descriptional AIM, like a fragment of DNA, holds in it, still non-realized so still a-temporal, the whole descriptional program corresponding to the pairing (GA? ,VA?), whether realizable or not (the a-temporal character is consistent with the posited invariance of DA with respect to the order of composition).

The *selection* - among all the syntactical possibilities offered by a formalism - of exclusively those that translate the *semantical* features to be represented, is unavoidable when an interpretation of the formal system is built. In particular the procedure is quite current throughout mathematical physics. (For instance, in a quantum mechanical problem of square potentials, the general solution of the differential equation of the problem offers exhaustively *all* the possible formal terms ; among these, those that have no physical correspondent in the data of the problem are dismissed, while the conserved expressions are specified as required by these data (limiting or initial conditions, etc.), which cannot follow syntactically ; another - striking - example can be found in Schrödinger's solution of the problem of a one-dimensional harmonic oscillator where subtle and very constructed physical arguments are introduced in order to *identify restrictions* that are *not* imposed mathematically ; etc.).

- Given a pair of arrows d? , DA? , the composition, in this order, is always possible formally. But it is MRC-*significant* iff DA? *corresponds* to the content of data supposed to be carried by d? (this, being a fundamentally semantical matter, cannot be established formally). The composition will be taken into account only when it is semantically significant. We then call it an *induction arrow*, we denote it indDA? (in short indDA), and we write

$$indDA? = d? \; oDA?$$

with $s(indDA)=S_R$ and $t(indDA)=S_{CF}$, which represents formally an induction of a descriptional aim from R into CF.

- Consider the representation (G? , V?) of an epistemic referential. Formally the two corresponding operational-arrows G? and V? are always composable in this order. MRC *also* requires - for methodological reasons - to *systematically* admit *a priori* the composability, but to exclude it *a posteriori* if the condition D7 of mutual existence or the condition of individual or probabilistic stability involved in D14, appears to not obtain. So inside C_{MRC} we proceed as follows. First, systematically - and tentatively - we do form the composition between G? and V? , in this order, naming it a *descriptional--arrow* D? (in short, D). Thus we write

$$D? \; ?= G? \; oV?$$

with s(D)=S_R and t(D)=S_D (so belonging to Hom(S_R,S_D). But if later it is found that no description arises because D7 or the condition of stability from D14 fails - which, being fundamentally a matter of semantics, cannot follow syntactically -, then we cancel *a posteriori* the previously formed arrow G? oV? *and* the corresponding epistemic referential (G? , V?). The composed arrow D? =[G? oV?] is the operational nucleus of C_{MRC}. It has to be constructed so as to yield a satisfactory formal expression of *all* the conditions relevant to the considered description, as required by D14 (so P10 and ?11) as well as by (according to the case) P15, D16, D19 :

In consequence of P10 and ?11, D? involves an (in general) non-commuting algebraic structure imposed upon the set of arrows V? .

- Given an epistemic referential (G? , V?), the following corresponding composition, called a *complete-description-arrow* (in short CD) is always possible and significant :

$$CD? = CD = d? \circ DA? \circ DAa? \circ G? \circ V? \; ?= indDA? \circ DAa? \circ G? \circ V?$$

with s(CD)=S_R and t(CD)=S_D (so belonging to Hom(S_R,S_D). The explicit "sites-trajectory" of a complete descriptional process arrow CDP? is

$$S_R\text{-}S_{CF}\text{-}S_{CF}\text{-}S_{CF}\text{-}S_R\text{-}S_{œ}\text{-}S_D.$$

The triplet S_{CF}-S_{CF}-S_{CF} expresses satisfactorily the dominant role of the consciousness functioning.

- Other compositions also are permitted by the introduced definitions (for instance GAa? oG? , VAa? oV? , etc.). But it seems not necessary to examine them exhaustively.

Notice that the MRC-definition D2 of reality requires to extend now the previous assumption S_R? ??Ob(C_{MRC})] by positing explicitly S_R? ??Ob(C_{MRC})+Ar(C_{MRC})].

The axioms C1 and C2

They seem to raise no problems.

Representation of the evolving contents of the C_{MRC}-sites

The theory of categories does not specify a general modality for expressing individualizations *inside* an object from Ob(C), as being the source or the target of an arrow tied with that object. While *MRC involves such individualizations quite essentially*. So we construct the necessary individualizations as follows.

We consider only the operational arrows G? ?and V_g? that form the hard core of C_{MRC}. This will suffice.

Each arrow G? can be labeled by a pair of indexes (G,$œ_G$) defining respectively its *local* start inside S_R (by the "spot" R_G where G has to be applied (D4)) and the *element* $œ_G$ from the evolving set {œ} that constitutes the content of $S_œ$ by the *creation* of which the considered G? arrow ends. So for each *definite* arrow G? we shall write (G,$œ_G$)? , which distinguishes it from any other arrow G? . Thereby the set {(G,$œ_G$)? } of the generation arrows - itself also an evolving set - is now *connected* with the evolving *inner* contents of the two sites S_R and $S_œ$ represented, respectively, by the evolving sets {G} and {œ}. This connection can be then organized more by putting mutually compatible structures on the sets {G}, {œ} and {(G,$œ_G$)? } (physical operations of object-entity generation are subject to the frame-principle P8, which requires a convenient extension of the principle P10 of mutual exclusion, to operations of object-entity generation also).

Mutuatis mutandis one can connect in a similar way each *definite* processual arrow V_g? , with a "pair" of indexes ($œ_G$, {gk}), k=1,2,..., writing ($œ_G$,{gk})? , k=1,2,... where k takes on a unique value if the attempted descriptional process reveals an individual stability, or a whole *set* of different values if it reveals a probabilistic stability ((D5.1), ?12, ?13, D14). In ($œ_G$,{gk}) the index $œ_G$ defines the *element* from the discrete evolving content of the source-site $S_œ$, where ($œ_G$,{gk})? begins, and {gk}, k=1,2,... defines the *element* from the discrete evolving content of S_D by the *creation* of which ($œ_G$,{gk})? ends. So the - evolving - set {($œ_G$,{gk})? } of aspect-view arrows is connected with the evolving contents of the sites $S_œ$ and S_D, expressed respectively by the sets {œ} and {gk} (where {gk}, k=1,2,..., g *fixed*, amounts here to the description of $œ_G$ *via* V_g, which is an element from {D}). The connection between the evolving sets {$œ_G$}, {($œ_G$,{gk})? } and {D} can be then organized more by putting on these sets mutually compatible structures that shall obey all the MRC-requirements and furthermore shall conveniently reflect the particular considered class of descriptional processes (the nature presupposed for the object-entities and the aspect-view-examinations).

The procedure can be extended to the class of arrows V? ?: each *definite* V? arrow is a set of arrows {($œ_G$,{gk})? , k=1,2,...}, g=1,2,...m, m finite (D5. 2).

Then a relative description D/G,$œ_G$,V/ from MRC becomes in C_{MRC}. a complete-description-arrow [CD? = CD = d? oDA? oDAa? oG? oV?] where G? oV? ?is indexed :

(G,$œ_G$)? ?o ($œ_G$,{gk})? , k=1,2,...}, g=1,2,...m, m finite

Inclusion of the gensets

Consider the minimal intrinsic meta-conceptualization [MIN.$D^{(1)}$] (D19.3) of a basic MRC-transferred-description $D^{(o)}/G^{(o)},œ^{(o)},V^{(o)}/$ of a physical basic object-entity $œ^{(o)}$. It introduces a *unique* basic physical generator $G^{(o)}$ while the basic view $V^{(o)}$ contains some finite number m(b) of basic branch-views $V_b^{(o)}$ (fig.1). Its C_{MRC}-representation involves *one* generation arrow $(G,œ_G)?$ } constituting a common "trunk", and m(b) branch-view arrows $(œ_G,\{bk\})?$, k=1,2,... that start all at the same element from {œ},inside $S_œ$, but then separate from one another each one yielding - by repetition of the pairs $[G^{(o)},V_b^{(o)}]$ - the corresponding bk-results, k=1,2,... that compose a (factual) branch-description of $œ^{(o)}$. So inside C_{MRC} the genset corresponding to $D^{(o)}/G^{(o)},œ^{(o)},V^{(o)}/$ is transposed into a tree-like structure of arrows : we shall call it a *C_{MRC}-genset*.

C_{MRC} versus quantum mechanics

We consider the Hilbert-Dirac formalism of quantum mechanics.

The Hilbert-space H of the state-ket-vectors ⁇ ? of the studied microsystem corresponds to the C_{MRC}-site $S_œ$ where are lodged mathematical representations of the considered class of object-entities. The set {⁇ ? } of state-ket-vectors ⁇ ? from H corresponds to the evolving set {œ} from $S_œ$. (The *vector* -space structure assigned in quantum mechanics to t{⁇ ? } is a *particular* feature entailed the principle of superposition posited for quantum states, a principle justified by the wave-like features manifested by what is called quantum states).

> The C_{MRC} generation arrows $(G,œ_G)?$ have no correspondent in the quantum mechanical formalism.

The quantum mechanical (in general) non-commuting linear differential "dynamical" operators O defined on H correspond to the C_{MRC}-aspect-view arrows $(œ_G,\{gk\})?$, k=1,2,....

The quantum mechanical representation of a state-ket ⁇ ? with respect to the basis B(O) introduced by a given quantum mechanical operator, namely as a column-matrix of which the elements are calculated with the help of ⁇ ? and B(O), corresponds to a *basic transferred* description $D^{(o)}/G^{(o)},œ^{(o)},V_g^{(o)}/$ from S_D created for a basic object-entity $œ^{(o)}$ by a basic aspect-view-arrow $(œ_G,\{gk\})?$, k=1,2,.... (that can be re-written $(œ^{(o)},\{gk^{(o)}\})?$, k=1,2,....).

The set of all the column-matrix reprsentations of a given state-ket ⁇ ? with respect to all the bases B(O) introduced by all the quantum mechanical dynamical operators, corresponds in C_{MRC} to a complete-description-arrow CD? =CD=d? oDA? oDAa? oG? oV? (with G? oV? indexed : $(G,œ_G)?$ $o(œ_G,\{gk\})?$, k=1,2,...}, g=1,2,...m, m finite).

So it will be possible to attempt a systematic transposition of the Hilbert-Dirac formulation of quantum mechanics, in terms of the theory of categories, *via* MRC with its central concept of genset.

It is of course obvious from the start on that the explicit C_{MRC}-representations of reality and of the consciousness-functionings have no correspondent in quantum mechanics where not even the actions of object-entity generation are represented mathematically, *nor* are they at least conceptually and verbally clearly distinguished from the qualifying actions, *via* measurements. By comparison with C_{MRC} quantum mechanics appears as flawed by very flattening lacunae.

Nevertheless, once the main relations C_{MRC}-(quantum mechanics) have been established, the quantum mechanical formalism becomes a precious guide for a subsequent development of C_{MRC} (any non-necessary restriction suggested by the - particular - case of quantum mechanics will have to be carefully avoided). One first important step in the mentioned direction will be the identification of the generalized *MRC-meaning* of Dirac's dual space of linear functionals defined on the Hilbert space of state-ket-vectors, and of the various sorts of scalar products from the Hilbert-Dirac formulation of quantum mechanics. Then the C_{MRC}-transposition of these, as well as the *generalized* C_{MRC}-transposition, will have to be conveniently achieved.

Concluding comment on C_{MRC}

The outline indicated above needs development. For instance, the condition S_R? ??Ob(C_{MRC})+Ar(C_{MRC})] imposed by MRC entails *reflexive* characters that might raise difficult syntactical problems connected with the definition of the categorial concept of a sub-object; The postulate, the principles and the propositions from MRC must *systematically* acquire inside C_{MRC} mathematical expressions, and the MRC-propositions must furthermore acquire mathematical proofs. Etc..

But the effort - certainly - is worth while.

Indeed MRC incorporates what I consider to be *the deepest epistemological innovation involved in nowadays modern physics*. It incorporates it mainly *via* the concept of genset, whereby the whole "modal" Kantian dimension [potentiality-actualization-actualized] is brought in, in general and explicit terms, and fully equipped with all the involved relativizations. Once recognized, the concept of genset acquires an autonomous, quite general and fundamental importance. It is perhaps the major gift from [quantum mechanics+MRC] to epistemology, logic, probabilities, mathematics in general, and possibly even to metaphysics. A still unachieved gift that will have to be developed from the points of view of *all* these

different disciplines. But a revolutionary gift, I think, that saws with deep-set and unifying progress the whole of our conceptualization.

While achieving a full mathematical representation of MRC in terms of the theory of categories, the central MRC-concept of genset might set into a guided progress the theory of categories itself, and more generally the whole logico-mathematical thinking. This, once more in the history of human thought, would manifest the organic relation between the evolution of mathematics and that of physics. Classical mechanics has strongly contributed to the generation of mathematical analysis. Quantum mechanics, *via* the gensets, might lead now to a new logico-mathematical era.

But let us come back to MRC itself, as a whole. Imagine that - under the precious guidance of the quantum mechanical formalism as it now stands - a full mathematical representation of MRC has finally been worked out.

> This would endow us with a mathematized epistemological method drawn from modern physics and where the consciousness functioning - with its aims and actions - is given a legal definite status, while "reality" and its relations with knowledge are explicitly represented. Thereby physics and philosophy would finally merge together.

As for quantum mechanics from which MRC stems, it would by feedback acquire a new formalization in terms of categories and gensets, with respect to which the various present day formulations would look - from a conceptual point of view - like bas-reliefs with respect to the corresponding sculpture.

III. CLASSICAL LOGIC [20] *VERSUS* MRC

We shall now, by a brief sequence of remarks, try to convey a notion concerning the gap between MRC and classical logic. This will built the bridge toward final considerations concerning the relativistic approaches which are immersed in classical logic.

The logic of classes and predicates has first been developed by Frege. The starting remark is that a predicate "determines" a class of objects, namely those that partake of the meaning (sense, comprehension) of the considered predicate and hence constitute its extension. In order to identify these objects, firs *(a)* it is remarked that a predicate, by itself, is neither true nor false, but that *(b)* its assertion concerning a given object-entity *can* be true or false *if* the predicate is "pertinent" concerning this object-entity. Then *(c)* for each predicate P a

[20] Grize J-B., (1967) *Logique des classes et des propositions*, dans *Logique et Connaissance Scientifique*, Encyclopédie de la Pléiade, Gallimard..

propositional function $f_P(x)$ is introduced where f_P represents the predicate and x is an *object-variable* :

> «The expressions which .....include letters 'x','y','z', and are such that they become true or false propositions as soon as the objects designated by these letters are specified, are called propositional functions (J-B. Grize, ref. 10, p. 150)».

And *(d)* it is posited by definition that any *value of the object-variable x* for which $f_P(x)$ is true, belongs to the class determined by P. In short :

> *The class of P is the set of values of the object-variable x for which $f_P(x)$ is true*.

Let us stop for a moment and refer to MRC. So - from the start - the concept of "truth" is introduced. The objects that belong to the class determined by a predicate are identified *via* a definition that combines in *one* representational act, the description «x is P» *and* the meta-description «it is true (or false) that (x is P)». This violates the principle of separation PS (P15). In fact the approach is still more intricated.

> Though the predicate P is said to determine *itself* the class of objects that partake of the qualification P, this predicate is from the beginning on *dissolved* in the meta-predicate of [*truth* of P] : the description «x is P» - just a piece of meaning, *no matter* whether true or false, - is first introduced *un*achieved, and then it comes into being together with, and *indistinctly from* the meta-description «it is true (or false) that (x is P)».

Correlatively the predicate P is neither endowed with some structure, nor is it subjected to any conditions of effectivity of the examination which P is supposed to perform on x. While no structure is specified either for the meta-predicate of [truth of P]. In this way :

> The predicates are reduced to no more than labeled shadows of - undefined - *intensive* extracts from factuality, that are then smuggled away by an immediate translation in terms of purely *extensive* correlates in the realm of object-entities œ.

Consider now these object-entities themselves. For the object-variable x and its values (these last ones are the object-entities œ), *no genesis whatever is specified*. They are simply posited to pre-exist "out there", waiting to just fall inside the field of perceptibility of - directly - the *meta* -predicate [*truth* of a qualification by the predicate P].

> *The generators G are simply not considered.*

(This is less estonishing concerning classical logic, than concerning quantum mechanics). If this way is associated with a Platonistic view, it still remains possible, notwithstanding the occultation of the generators, to include the abstract concepts among the object-entities available for truth-qualifications posited to somehow correspond to qualifications *via* some shadow-predicate labeled P. As for *physical* object-entities, those which are transferred directly on the sensitive biological apparatuses of the human beings *seem* to pre-exist "out there" available for examinations of [truth of P's]. But this illusion ceases to work for the physical objects-entities that can be neither directly perceived, nor just detected by some artificial extension of the human domain of perceptibility. All these object-entities, if they are not first *radically generated* by deliberate factual operations of object-entity-generation, are simply *ELIMINATED a priori*. This is a huge arbitrary amputation which in fact is constantly transgressed by current procedures. The case of states of microsystems, for instance, are closed out of the classical logic of classes and predicates, already in consequence of the very first steps into this discipline. One understands why, for current rationality, quantum mechanics seems unintelligible.

The contrast with MRC is striking. There - by norm - an object-entity is systematically introduced by an operation of generation defined *independently* of any subsequent qualification, even if it can be spontaneously perceived and so also qualified in consequence of the very act of generation (see the global final comments on the definition D14). And, at the beginning of a descriptional chain, this operation of generation, though it has been imagined inside some conceptual framework, nevertheless *acts* in a purely factual way and forms and captures a bulk of still entirely unknown Being, an unspeakable fragment of non semantized factual matter that is thus made available for *non specified* subsequent qualifications. It is precisely this total *liberation* of the epistemic operation that produces the object-entity, from the epistemic operation that produces qualifications of this object-entity, that permits then to decide - before any description - concerning the mere possibility of meaning, *via* specifications of relative existence (D7) of - exclusively - the considered object-entity, and *any* view V (a P), *without any need of truth-criteria*. And it is equally this that automatically entails a fully accomplished self-contained first phase of pure description «x is P» (just a self-contained assertion of meaning, not addicted to an immediate inflational flight into a *meta*-qualification of truth). A meta-description of factual truth of this initial description is a quite distinct and optional future step that can be accomplished only *if* the initial description «x is P» *does* exist in the sense of D7 with respect to the view of factual truth of it, which is far from being a trivially definable and a trivially satisfied condition. (Much later Tarski has introduced this distinction otherwise («the snow is white» is true iff the snow is white), but without requiring in *all* respects systematic relativizations). In short :

The absence of a definition of the object-entity, that be *independent* of any qualification and permitted to be in particular even non-verbal, purely operational, restricts *a priori* the domain of object-entities to which the classical logic can be applied.

The very next step already strengthens this first conclusion. By definition :

Two classes of object-entities ? and ? ?are" equal" iff all the elements of ? are elements of ? and vice versa (iff ? and hold the same elements) .
Two propositional functions f ? et f ?? that determine two classes ? and ? are" equivalent" if the classes ? and are equal (cf. op. cit.).

But how can one know, for instance, whether yes or not for any value of x for which it is true that it is red, it is equally true that it is spherical ? It is implicitly supposed that the answer to such questions can be always given. But this supposition is founded upon the same restrictive hypothesis that any value of any object-variable x pre-exists out there, already accomplished, ready to be pointed toward with one's finger, certainly available for examination *via* the meta-predicates [truth of P's]. And furthermore this time it also is implied that such an examination *never changes* the considered value of an x. Indeed imagine that this were *not* the case *and* that the considered value of an x has to be first created in order to have it available for examination. In such conditions, in general, the examination of this *individual* replica of a value of an x, *via* ? , can change it in such a way that *this* replica is no more available *itself* for also another examination *via* ? (like in the case of a quantum mechanical state of a microsystem) : then the logical conjunction of the two propositions «x is ? » and «x is ? » would cease to be always endowed with *meaning* (which is a condition prior to any truth-valuation), and the general form of logic would have to be modified, as it does happen indeed in what is called quantum logic. So the new definitions of equality of classes and of equivalence of propositional functions - like the preceding one of the classes themselves and again in consequence of the absence of an explicit and independent specification of the mode of generation of the object-entities -, are vitiated by an arbitrary *a priori* restriction of their domain of validity. Namely a restriction that marks the whole *FORM* of the logic of classes and predicates.

So the general conclusion is as follows.

The classical logic of classes and predicates - that founds the whole modern classical logic - floats *above language*, inside the stratum of the already *pre*-verbalized-conceptualized. The factual rootings of the processes of conceptualization remains hidden to it. This amputates *a priori* its domain of pertinence and induces an implicit restriction of its whole formal structure.

Classical logic is even *required* to be cut from any semantical substance. It is required as a "pure" syntax, freed of any intension. But this severance is illusory. It could be imagined to be possible precisely because the way in which factuality is drawn into descriptions at *each* local relative zero-point of a descriptional chain, was so completely ignored. As soon as one becomes aware that any local zero-point of any descriptional chain consists of a (more or less canonical) *transferred* description, this illusion of the possibility of a complete (!) elimination of semantical content, from a syntax, is dissolved : any syntax stems from numerous bulks of factuality, each one of which can be prospectively regarded as a monolith of still non-individualized relative potentialities of observable manifestations out of which are then drawn threads of actualization of these relative potentialities, that yield - beneath words - the prime *matter* for the considered transferred description ; *this* factual prime matter is what goes over into language by primary coding. Language is charged and recharged continually with non removable factually, through an evolving infinity of ground-points of adduction. Language is a circulatory-system *for* factual, semantizable prime matter. This is how it emerged and got form genetically, *in order to* carry from mind to mind informations *about factuality*. If not the societies of men would not have lasted, they would not even have begun. Our minds work with intensions that have infused into language at *all* its levels of abstraction, so, unavoidably, they have infused into logic also, generating its "real" variant [21] which, more or less implicitly, commands in real circumstances our choices, methods, and actions. If on the other hand in theoretical logic they are *a priori* refused, they instill there by reaction awkward features as well as difficult *non necessary*, fictitious problems, like for instance those of the connectivity of modern logic with modern semantics. (Try to re-design *in abstracto* the human circulatory system strictly without using as a guide the condition that *blood* has to circulate in it *so as* to nourish every tiny volume of living tissue : what is the chance to find the real scheme ?). A trivial but striking example is that of equality of all the void classes.

In consequence of the extensive (ensemblistic) definition of the class determined by a predicate, all the void classes are equal because they all contain "the same element", namely the null element Ø. So, if it is true that no immortal man exists, and it is equally true that no symphony shorter than one minute exists, then the class of immortal men and that of symphonies shorter than one minute, are equal. This argument induces a feeling of artifice, of twisting of what one would be prepared to accept as "meaningful". One feels a gliding. The trajectory of this gliding can be retraced :

When one wants to determine *quantity*, extension, number of elements, starting from only the *quality* - the predicate - that qualifies, a ground for ambiguity is surreptitiously inserted.

[21] The "natural logic" developed by J.B. Grize.

So long that a class in the sense of Frege is not void, the quality specific of this class - that one expressed by the predicate P that determines the class - is present, *it is held by each element of the class*. But at the limit where the class becomes void, the specific quality P that characterizes the class is discontinuously transmuted into pure, qualitatively indistinct quantity, into *a purely numerical zero*. This transmutation has been instilled as follows. The mathematicians, when they defined the number zero, in fact have extrapolated into nothingness a certain *quality*, namely the "numericity" P=N of *any* (finite) number, so the *predicate* N of which mathematics studies the manifestations *via* the object-entities called "numbers", of which a quite general property is to be able to "measure" (numerize, quantify numerically). It is this prolongation of numericity, of predicate P=N, which, by definition, has been called "the number zero". Whereas the logicians, while they make use of numbers in order to measure the quantity of supports of a given quality P - but this time *any* quality P whatever, any predicate -, did not take care to prolong into nothingness *also* this quality P, in order to dispose of a veil of quality P - specifically - to be co-extended, together with the mathematician's zero-of-numericity, over the void encountered at the limit where *the quantity of carriers* of *this* quality P, only measured by a number, comes to an end. So at that limit they are left with only a zero-of-numericity, uncovered, stripped of quality P. While the other numbers of carriers, 5, 100, etc., *were* all tied with also the quality P characteristic of the considered class. *There is no conservation of the method of representing a class*, there is a breaking of continuity inside the way of representing a class. This is a heavy methodological error, comparable, for instance, to a dimensional inhomogeneity inside an equation. The inhomogeneities of conceptual treatment inside a closed conceptual system are always the source of very slippery problems. Any two void classes are considered to be "equal" on the basis of a purely extensive estimation of the null content of a concept that has been first characterized in a primordial intensive way, even if this characterization had also an extensive counterpart : a predicate P is *only* quality, and, by definition, it is P that *determines* the corresponding class f_P. It is then inconsistent - if one distinguishes clearly between quality and [quantity of supports of this quality] (between views V and object-entities $œ_G$ that exist in the sense of D7 with respect to this view) to permit the definitory quality to disappear because all its supports disappeared, while *the class is still maintained*. The class f_P determined by P should subsist with vanishing-support-OF-QUALITY-P when the set of numbers that label the supports reduces to the number 0. It is inconstant to end up in an idolatrous manner when one began by adoring an abstract God. One should act like the mathematicians, or like Lewis Carrol who leaves us with smile-of-cat-without-cat when the smiling cat vanishes completely.

But inside MRC the procedure that takes into account situations of this kind is preorganized still much more radically : as soon as one considers a class of - *independently*

defined - object-entities $œ_G$, and a view V, the test of their mutual existence is methodologically required *before* trying to perform the corresponding relative description. If this test is negative one finds oneself precisely at the limit that can be called «the void class *determined by V inside the set of object-entities* $œ_G$, which means «absence *of object-entities* $œ_G$ *admitting of the qualification V*». In other terms, a *doubly* relativized void that could be symbolized, for instance, by the sign [Ø(V/G)]. So inside MRC there emerges naturally a concept of relativized, *mutual void* (see ref. 7 concerning the case of quantum mechanics where there is much confusion concerning the source of this sort of mutual incompatibility). This preserves of a whole category of false problems. Indeed the absolutization of the logical void is one of the most prolific sources of illusory problems.

The preceding considerations permit to understand in what a sense the classical logic introduces arbitrarily restricted and insufficiently differentiated conceptual grounds where the slidings toward relativism - according to which it is always possible to assert anything about anything - cannot be fully controlled, in consequence of systematic absolutizations. While as soon as all the involved relativities are explicitly taken into account, the maximal available conceptual volume becomes apparent. If it is fully utilized, falls toward relativism can be excluded whatever the complexity of the considered descriptional situation. In particular, *inside any given epistemic referential, the type of homogeneity consisting of the conservation of the method of representation throughout this referential, is insured* (as well as all the other sorts of descriptional homogeneity entailed by the principles, postulate, definitions).

The situation concerning classical logic has prolongations in various domains of modern science, in particular in the theory of sets, notwithstanding Russell's theory of logical types and the Gödelian revolution. Indeed the elements of a set are always supposed to somehow pre-exist already realized, and this, just like in the definition of the equality of two classes and of the equivalence of two propositional functions, entails arbitrary *a priori* restrictions. This comes into evidence by contrast with gensets.

But in this context the most noteworthy is the fact that classical logic, because of its lack of explicit contact with factuality, has authorized a surreptitious gliding [conceptualization-logic -(formal systems)-calculus-computation] that veils the *specificities* of the descriptions of *natural* object-entities, and also the specificities of the particular type of connections between these and computational representations, in particular simulations.

I add a final remark that leads over to the following, last chapter. While the flux that tends to generate a new logic, explicitly rooted in factuality, stems from modern physics (quantum mechanics), one of the most prominent constituents of modern physics itself, namely

the relativistic approaches, are developed quasi exclusively under the constraints of formal consistency in the sense of *classical* logic : *factuality plays no explicit role*. The unique explicit aim is to construct "good" concepts and principles that shall insure a maximized degree of inter-subjective consensus. Thereby the relativistic approaches somehow escape the permanent semantical control that the syntaxical structure of quantum mechanics - generalized by MRC - does insure. This circumstance determines a scission inside the system of modern physics as it now stands.

RELATIVISTIC OBJECTIVITY

It has already been mentioned that Einsteinian relativity and the problems of interpretation of the quantum mechanical formalism have rendered the physicists of this century increasingly receptive to the fact that any representation of "real facts" non removably bears marks of the human ways of knowing and thinking, and of the aims of men. However on the level of *explicit* principles the classical concept of objectivity still persists among the physicists, often rather radical and unshaken : many continue to believe in an asymptotic progression of knowledge toward representing how the "independent reality" *is*. But meanwhile, the technical developments of the theoretical physicists specialized in relativistic approaches, acquire a resolutely new character. The aim to "discover" how the physical reality "is" recedes. What is ever more explicitly attempted is to just construct representations of the physical reality *such* that they shall be able to insure inter-subjective consensus with respect to specified - and as large as possible - groups of transformation of the state of observation assigned to (imagined for) the human observer : these are the new forms of the relativistic objectivity. I shall indicate very briefly the main stages of the development of these forms, referring them to MRC in order to facilitate the comparison with quantum mechanics.

Limiting conditions and laws

Let us go back to the fact that only descriptions can be known in a communicable way. Now, it is obvious that it would be nonsense to wish to describe "all" that "exists" : at any given time the possible object-entities constitute an open and evolving infinity of which the cardinal is bigger than that of the continuum. So the idea of a choice to be made has naturally imposed itself as a non transgressable constraint. It has been tacitly agreed that only *regularities* can be regarded as an object for scientific description, only relations endowed with a certain stability, concerning which it is possible to insure a certain consensus, and which permit predictions. Relations of this type were called *natural laws*.

But according to what criteria, exactly, can one identify what can be object of a natural law ? Up to this day the answer to this question has never ceased reorganizing itself. The main stages of this process can be regarded as fundamental features of the development of scientific thinking. The beginning of the process is relatively recent. It emerged during the epoch that separates Kepler from Newton : Kepler still tried to find, concerning the geometrical dimensions of the planets, laws of the same kind as those that he had formulated concerning the trajectories of the planets. While Newton considered already that the geometrical dimensions of the planets were "inessential" so that one had to isolate them from the researched laws and, if wanted, to introduce them afterward in connection with limiting conditions (space-time values on the frontier of the space-time domain covered by a given physical phenomenon) in order to specify and predict this or that particular

manifestation of a law. So, by definition, what is called law is categorial, regular, and generates predictions ; while limiting conditions are singular, accidental, non predictable, just singular data that have to be registered or supposed and have to be used in order to explicate the individual predictions that one wants to draw from a law.

Notice that in this first stage the distinction between law and limiting conditions is introduced as absolute, as intrinsic : this *is* essential, regular, that *is* non-essential, accidental. Just obvious facts that need no criteria for being recognized. And *no criterion* is given for distinguishing what is essential and what is not.

Space-time and space-time referentials

All the representations of physics presuppose space-time. So, if one wants to construct mathematical representations, it is necessary to specify in mathematical terms how space-time features have to be taken into account. This essential question runs straight into metaphysics. So it is not surprising that its treatment brings in a mist of ambiguous ways of speaking that are obstacles in the way of a clear understanding by non specialists, of the relativistic approaches. Moreover they hinder an acceptable connection of physics, with epistemology and philosophy

In modern physics it is (more or less generally, see ref. 17) admitted by principle that *void* physical space (without any mass) as a whole admits of an *absolute* mathematical representation consisting of a continuous 3-dimensional variety that is indefinitely differentiable, homogeneous (all the points are equivalent), and isotropic (all the directions are equivalent). It is furthermore admitted that physical time can be represented by a continuous 1-dimensional variety that is indefinitely differentiable, homogeneous, and endowed with an arrow (a direction). These two representations can be associated in a unique 4-dimensional one corresponding to physical space-time.

In order to give a mathematical form to the descriptions of physical entities, it is convenient to introduce formally a system of 4 *reference* axes endowed with a center and immersed in the 4-dimensional variety that represents space-time. Indeed this permits to associate numbers - space-time-coordinates - with the points of this variety. These numbers can then be explicitly associated with the qualifications of the physical object-entity *via* numerical gk-aspect-values, g?ET, which necessarily come in (P8), and they will represent mathematically the space-time qualifications which, in a non removable way, underlie the description of any physical object-entity (P8). Such a reference-system is called a space-time referential. Such a reference-system is called a space-time referential.

Now, it is often said - and here come in the ambiguous ways of speaking - that "void space-time admits of a Euclidean metric", while in the presence of fields this metric "of space-time" becomes in general non-Euclidean. What can this mean ? We specify by reference to MRC.

In consequence of its character of a void "form", as posited by Kant and re-expressed in the frame principle P8, space-time itself *(a) conditions* any description of a physical entity; *(b) contributes* to any description of physical entity, namely in the role of a space-time frame-view V_{ED} associated with at least one other aspect-view $Vg?V_{ED}$; *(c)* space-time *alone*, in the absence of any other physical entity, *cannot hold the role of object-entity*. So :

Space-time is not a phenomenon. Space-time alone cannot be described.

So - rigorously - one cannot speak of the metric *of* space-time. One can only speak of a metric chosen for a space-time-*referential*, a space-time view V_{ET} which, in a relative description of some physical entity $œ_G$?[space-time], is associated with one or more aspect-views $V_g?V_{ET}$. And the expression "the structure of space-time" points in fact toward structures *of results of measurements on the considered object-entity* $œ_G$, measurements of lengths-of-some-aspect-tied-with-$œ_G$ (or distances, or surfaces, or volumes-of-some-aspect-with-$œ_G$) and durations-of-some-aspect-tied-with-$œ_G$, all this in presence of fields, or in the void.

Finally notice also that the adequacy of the conditions of continuity and indefinite differentiability of the 4-dimensional variety by which space-time itself is represented, certainly is not universal (Laurent Nottale [22] has well brought this into evidence) : according to MRC all the descriptional relativizations involved in descriptions of physical entities have to be systematically introduced. So in particular one has to accomplish also the relativization to the view of "order of magnitude of the presupposed space-time units", that are always *finite*, and the corresponding *exclusions* by mutual *in*-existence (D7) have to be explicitly specified.

Let us now explicate the meaning of the "equivalences" assumed in the current definition of the 4-dimensional variety that represents space-time (between the points (homogeneity) and between the directions (isotropy)).

Principles of symmetry and geometrical invariants. Conservation laws

What is called homogeneity "of space-time" is that what manifests itself in the descriptions of physical phenomena by the requirement that what is posited to be "essential" be independent of the geometrical (static) changes of *exclusively* the position of the center of the utilized space-time referential (translations of the referential) ; or otherwise, that it remain *invariant* when such a change is performed. So according to this requirement the space-time coordinates (positions) are not essential, while the differences of the coordinates (distances) are essential. Consequently any velocity is essential because, as a ratio of two differences of coordinates, one of space-coordinates

[22] Nottale, L., *La relativité dans tous ses états*, (1998), Hachette.

and one of time-coordinates, it is globally invariant with respect to translations of the space-time referential.

So there appears now a *formal criterion* that permits to distinguish between what is essential and what is not. This criterion brings into evidence a *pair of relativities*. Namely a pair consisting of, on the one hand, a relativity to what is called homogeneity - a "symmetry" - assigned *abusively*, in current speaking, to space-time itself, but which in fact designates only an invariance *of the descriptions of physical object-entities* (cf. the preceding discussion of metrics "of space-time") ; and on the other hand, a correlative relativity to a definite class (group, in mathematical terms) of changes of the state of observation expressed by changes of the space-time referential, namely the group of geometrical, static translations of the referential, called so because they involve exclusively the consideration of the different possible positions of the center of the referential, in the absence of any movement of the referential.

So the invariants tied with what is called the "principle of homogeneity of space-time", are essential in *this* sense that, when changes of only the position of the center of the space-time referential are operated, they manifest the mentioned principle in the form of a descriptional *independence* with respect to these changes, an indifference, a recurrence of a descriptional *in - variance*, a *conservation law*. While the coordinates of the physical events, because they do change when the center of the space-time referential is translated, are regarded as inessential ; this qualification of non-essentially being asserted notwithstanding that it is absolutely necessary to know the coordinates of the involved events in every particular case in which one wants to be able to make predictions concerning this case individually.

Analogous considerations are valid concerning the posited equivalence of all the spatial directions, called the "principle of isotropy of space". In this case *other* invariants or conservation laws - angular - are involved, tied with the group of spatial rotations of the space-time referential.

Note now that velocity, which is by construction *fully* invariant with respect to translations - the *direction* as well as the norm -, is not invariant in direction with respect to rotations also. As for the coordinates of the involved events, again they are inessential in *this* sense that in general they completely change by a rotation of the referential. So the concept of essentiality is now explicitly regarded as relative to the considered group of transformations of the space-time referential, as relative to the specific population of observers among which the consensus is researched, and, correlatively, as relative to the specific objects of inter-subjective consensus that can be found inside this set of observers.

But why are these distinctions and ways of speaking been introduced ? *Are they imposed by factuality ?* It is quite clear that *another* sort of reason founds them :

For the observer tied with any given referential, the time-coordinate of the act of observation or of the observed events keeps changing irrepressibly. As for the space-coordinates, by the very definition of a space-referential they necessarily change by passage from a space referential to another one. *These* are indeed psycho-conceptual-physical *facts*, not mere free conceptual constructions. So, *if* one *wants* to elaborate descriptions endowed with stability, able to insure a certain consensus among distinct observers and to permit predictions, *then* one *has* indeed to find ways of organizing a conceptualization that bring forth invariants with respect to the universal and unavoidable changes of the space-time coordinates. While these themselves *have* to be accepted as unstable, as accidental : the contrary attitude would be hopeless, for factual reasons. So what is obviously impossible from the start is renounced. Now the aim might have come out to be impossible nevertheless, it could have appeared that no sort of stability whatsoever can be found. Then there would have been neither "natural" laws, nor science. But it so happens that the aim has been found to be *possible*, but only *relatively* to this or that group of transformations of the state of observation (of the space-time referential) that selects a corresponding. This restricted possibility is already very remarkable. But it should be quite clearly understood that it does not pre-exist in factuality. It is just an *abstract artifact* involving a whole adequate conceptual network - types of "convenient" space-time referentials (space-time-frame-views V_{ET}, Cartesian, curb, etc.), deliberate definitions of "convenient quantities" (convenient aspect-views V_g, velocities, accelerations, angles, total-energies), "convenient systems" also (convenient object-entities $œ_G$) - all conceived in such a way that when this network is superposed to factuality it delimits structures of descriptional elements able to insure domains of inter-subjective consensus concerning invariants tied with a corresponding group of transformations of the state of observation. In order to realize to what a point this is so, it suffices to consider that the equivalence of all the space-time -points from the 4-dimensional variety where one immerses the space-time referentials, is by no means a physical fact, it is just a posited idealization, an abstraction : the water does not boil at the same temperature here or on the Himalaya, and the astronomers know well that the laws evolve throughout the history of the universe. As for the directions from our life-space, they "are" not at all equivalent either, a stone falls from up toward down, not *vice-versa* or from left to right The physicist just makes the convenient abstractions up to the point where he obtains the concept of space-time that permits to *construct* relative consensuses and corresponding predictions. And the velocity, the energy, even the distance, even the *position*, are not facts, they are constructs concerning certain facts. Think of the position. Inside the 4-dimensional variety that represents space-time, there simply *are* no "positions", there are only "points" : position is a *concept* that is definable only when a *referential* has been already introduced. And inside the *physical* space-time there are even no 'points', there is only what we have in mind and try to point toward when we say

«space-time». Science is *a cognitive strategy* subjected to the *aims* of inter-subjective consensuses and of predictability.

Let us now go further in the examination of the aims with respect to which certain descriptional choices are convenient, and others are not.

Principles of relativity and dynamical laws

We have considered above groups of geometrical, static transformations of the state of observation. The different referentials from such groups are considered to be at rest with respect to one another. One can imagine the whole group as immersed in *one* big reference-receptacle containing variants of itself with shifted centers or with axes displaced by rotations : an observer could circulate freely from one of these variants to any other one. Such a view entails no conceptual difficulties.

But one can also imagine referentials that are moving with respect to one another. It is tacitly admitted that in this case each observer is tied to its own referential, even if he can communicate with the others by signals. this is a rule of the physicists' conceptualization game. What does this rule involve ? Does it still permit to insure a certain inter-subjective consensus and a corresponding predictability ? The answer is given by the position of *principles of relativity*, the principle of *restricted* (or *special*) relativity, and the principle of *general* relativity.

***** The principle of restricted relativity posits that all the observers tied to referentials that are moving with respect to one another with constant velocities - *inertial referentials* - perceive identically all the *dynamical* laws of physical phenomena, i.e. all the laws involving *accelerations* (changes of velocity ; this being indelibly connected with the assertion that, when the conceptor (not the observer) passes from the description of a phenomenon achieved in a given referential, to the description of this same phenomenon but achieved in another referential, all the involved space-time coordinates have to be changed accordingly to a definite *"law" for the transformation of the coordinates*. [23]

In other terms, according to the principle of restricted relativity, inside the set of all the *inertial observers* there exists an inter-subjective consensus tied with definite group of transformations of the space-time coordinates, the corresponding *new* invariants being this time the *dynamical laws*. And note that the geometrical invariants do *not* occupy the place of invariants with respect to also the new group of transformations : though the dynamical laws are expressed in terms of the quantities precedingly constructed such as to insure geometrical invariants, these quantities in general change when the inertial referential is changed while the asserted law of transformation of the coordinates is applied (such is the case for distance, velocity, mass, energy,

[23] The admitted transformation law has first been that proposed by Galileus. In 1905 Einstein has proposed a modified law (the Lorentz-Einstein transformations) that reduces to that of Galileus for velocities that are small with respect to the velocity of light.

etc.) : again what is regarded as essential changes with the considered group of transformations of the referential. Once more the relativity of essentiality to the type of the researched consensus manifests itself. We are now far indeed from the initial notion of an intrinsic essentiality or accidentality among the qualifications.

***** The *principle of general relativity* goes still much farther on the direction of the increasing degrees of constructional freedom that the modern physicist arrogates to himself. According to this principle the dynamical laws are invariant with respect to *any* change of the space-time referential, expressed by *any* transformation of the space-time coordinates.

The basic motive that determined Einstein to posit this principle - very shocking indeed - is the fact that *there is no way for deciding whether yes or not a given referential is inertial*. In such conditions Einstein considered that - for *philosophical* reasons - it was imperative to transgress the limitation to inertial referentials involved in the principal of restricted relativity. And he realized this transgression, but only for the case of gravitational interactions. The method that constructed by Einstein in order to achieve this descriptional aim is very impressive by its demiurgic degree of conceptual liberty (though it involves the way of speaking in terms of metric "of space-time" that was criticized before). In this context it would by as inappropriate to try to expose this method in several lines, as to try to expose it thoroughly. so I shall just remark that here again, the change of the set of observers among which consensus is researched entails a change of also the object of consensus, this time in both its form and its deep significance. The description is constructed in such a way that the object of consensus becomes - exclusively - the geometrical form of the trajectory of the studied moving bodies : this trajectory is always a geodesic of the metric from the achieved description. Whereas the invariants relative to the inertial group of transformations cease to be invariants in connection with Einstein's general principle of relativity. Einstein's general invariant - the geodesic form, with respect to the constructed metric, of the trajectories of moving bodies - is a so abstract that its factual semantic content nearly vanishes. (One has the feeling that a sort of conceptual law of compensation operates, according to which when the extension of the class of consensual observers is increased, the factual semantic content of the object of consensus is correspondingly diminished).

A fundamental question raised by the principle of special relativity is that of the status of what is called usually the transformation law for the coordinates, but also sometimes the transformation *rules*. Indeed it is far from obvious whether one is in presence of a physical law in the sense of a set of relations that is directly imposed by experience, or in presence, in fact, of just a posited set of relations for the pertinence of which only indirect confirmation or invalidation can

be obtained, *via* consequences that immediately observable. Sokal and Bricmont [24] (p. 173) incriminate Bergson because he considered that the Lorentz-Einstein laws of transformation *define* what numerical values have to be *assigned* to the space-time coordinates when a change of inertial referential is made, *in order that* all the inertial observers be authorized by criteria of *logical consistency* to admit the same numerical value for the velocity c of light, as it is required by the clearly *physical* postulate c=constant taken as a basis of the theory of special relativity : according to these authors it would be decidable by direct experiment what changes of the numerical values of the space-time coordinates do factually *occur* when one passes from a description of a phenomenon accomplished inside a given inertial referential, to the description of this same phenomenon accomplished inside another inertial referential. But the method indicated by them seems to be itself little known and checked, both in its principle and in its application. Rather, the Lorentz-Einstein transformations - like the ensemble of all the relativistic approaches - seem to manifest the physicists' progression toward increasingly free constructive attitudes which *a priori* are subjected only to conditions of logico-mathematical coherence. Experimental verifications come later, they are always punctual and they involve only globally a "verification" (a non-falsification) of the considered descriptional system, in a way that is moderated by the whole well-known structure of bemols which, since the first signal emitted by Karl Popper and through Kuhn's analyses, does not cease revealing its complexity.

> Furthermore since *(a)* in any given referential the dynamical laws are valid for any set of 4 coordinates, *(b)* according to the general principle of relativity any transformation of the coordinates has to be accepted, and *(c)* it is undeniable that the Einstein-Lorentz transformations do insure the *formal* invariance of the dynamical laws when an "inertial" change of referential is considered (toward a referential which, with respect to the initial one, has a constant velocity), it seems natural to ask oneself what *relevance*, exactly, the "*factual* truth" of this transformation law would possess (supposing that some definite operational meaning can be indeed associated to this notion).

Of course, one would like to be assured of something else, namely that there exists a possibility to *know* whether two *mutually* inertial observers, each one imprisoned inside his own referential, are indeed considering the *same* events, phenomena, etc., the *same physical situation*. But it seems that this question remained more or less implicit so far. Both principles of relativity have foundations and peaks of which the contours get lost in the tumults of a still too new penetration into the scientific descriptional strategies, of philosophical decisions of major consequence.

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[24] Sokal A. et Bricmont J., (1997), *Impostures intellectuelles*, Odile Jacob.

Summary

In the relativistic approaches the search for objectivity has explicitly transmuted into methods for deliberate construction of classes of inter-subjective consensus, each one relative to a definite group of transformations of the state of observation (of space-time referential). When the group of transformations changes, the objects of consensus in general change also. For each group what is qualified as essential is that what is invariant inside the group : essentiality relative to consensus. The aim to construct consensus, and inside a class of observers as rich as possible, is given absolute priority, on grounds which first were pragmatical but later coalesced with still feebly formulated philosophical requirements. *The content of the objects of consensus as well as their descriptional form are treated as secondary, they are accepted thus as they follow from the primordial aim.* The whole approach is mainly marked by requirements of logico-mathematical coherence. These are the main instrument for the construction of pairs **[**(group of transformations),(corresponding invariants)**]**. When the construction is achieved, its experimentally testable consequences - sometimes very rare - pledge the theory only globally and, whether for confirmation or falsification, in a way that is more cumulative and shaded than sudden and definite.

In the development of relativistic approaches an explicit tie with basic transferred descriptions (D14.2) is very rare if not inexistent. Correlatively the operation of generation of object-entities is ignored or at least remains implicit. Like in classical logic, the object-entities are supposed to pre-exist "out there". This is so even when their *formal representation* is thoroughly reconstructed for logico-mathematical coherence with previously constructed views, like in the case of the methods of gauge-invariance, or similarly, like in general relativity. In the relativistic approaches what is *INDEPENDENTLY constructed* is only the mathematical representation of *views* that generate invariant descriptions. The acts of independent generation of the object-entities are ignored. The object-entities are constructed only indirectly *via* the views, whereby their factual content is surreptitiously abandoned to subjection, manipulation and arbitrary uncontrolled impoverishment. In fact the relativistic approaches operate wholly inside the realm of *classical* logic which starts from the verbal pre-conceptualizations. There - far from the stage when factuality is absorbed into the conceptualization - they create just predicates insuring classes of intersubjective consensus. This situation is a consequence of the fact that the relativistic approaches first appeared inside the classical physics where an enormously thick layer of preceding theoretical conceptualizations of *macroscopic* physical facts underlie them : in these conditions the canonical structure of a basic transferred description simply did not appear. The generation of the object-entities that one wanted to study, by itself, raised no radically new problems. So it remained unnoticed. *A fortiori* the peculiar characters stemming from an independent generation of object-entities remained wholly hidden to the eyes of the relativistic approaches. All this reduced the object-entities to an implicit state of slavery.

The contrast with the case of quantum mechanics is striking, a genuine polarity.

CONCLUSION

Since the beginning of this century the construction of objectivity in physics advanced on two front-lines, in two opposite directions.

The front-line created in quantum mechanics roots the construction of objectivity into physical factuality, down to an unprecedented depth. Thereby it permits to explicate in full detail how the conceptualizations incorporate and vehiculate Being. The long-lasting belief in a non-transgressable scission between words and Being, will have to fade away.

On the other hand the front-line created by the relativistic approaches erects rigorous abstract representations with a vertiginous degree of descriptional freedom.

The connection and unification between these two distinct progressions is not yet worked out. inside modern physics. From this point of view there subsists there a scission.

Globally, there emerges a new image of knowledge. The incessantly originating role of the observer-conceptor, the part played by the descriptional aims, become obvious. The accent falls heavily on the liberty of mind. One feels an urge to announce this on the roofs.

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Biographical note.

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