

NORMS FOR DESCRIBING: THE METHOD OF RELATIVIZED CONCEPTUALIZATION (MRC)

IV.1. Preliminaries

Since 1982 I never ceased developing the method of relativized conceptualization ^{1,2} (and ref. 17) – let us denote it MRC – founded on the generalization of the descriptive scheme which I explicated from the quantum mechanical descriptions. This method can be regarded as an attempt at a certain "normation" of the processes of description of any sort, or in other terms, *a normation of the processes of communicable conceptualization*.

Because of the descriptive relativizations that are explicitly built into it at each descriptive step, MRC withstands by construction the insertion of false absolutes, thus warding off false problems or paradoxes. And because it roots its constructions in physical factuality, at the lowest descriptive level that can be reached, MRC furthermore withstands any gliding into relativism:

MRC stands in polar opposition to what is called relativism.

It means confined, delimited, but strict precision of each descriptive step, associated with free though guided choices of the way of connecting the descriptive steps accordingly to the evolution of the descriptive aim. Which insures controlled rigor throughout a progressive construction of freely decided trajectories and nets of conceptualization, always indefinitely open.

The main difficulty has been to find a way of escaping the imprisonment inside the forms which current language, surreptitiously, imposes upon thought. In all the preceding publications concerning MRC, in order to achieve this liberation I made use from the start on of certain ideographic symbolizations, but I never tried to achieve a mathematical formalization. The ideographic symbolizations, however, have been felt by many to stay in the way of a natural and full access to meaning. Therefore in this work I adopt a different strategy. In a first stage I expose the nucleus of MRC in usual language, trying to get through the stubborn implicit forms of thought induced by the current usage of words, with the help of exclusively the resources of the associations of words themselves (and of abbreviating literal notations of words). In a second stage I give a summary of the ideographic symbolization utilized in all the previous expositions of MRC, because it permits a more suggestive and economic expression of certain basic concepts and assertions. Finally, in a third stage I sketch out a *mathematical* formalization of the nucleus of MRC in terms of the theory of categories ³. The second and third stage can be omitted without in the least hindering the understanding of the subsequent chapters.

This chapter VI is devoted exclusively to the nucleus of MRC. The way in which the nucleus works will be illustrated in the subsequent chapter V, by showing how it generates a deep and fully relativized unification between the logical conceptualization and the probabilistic one.

IV.2. The First Stage: a Presentation of MRC in Usual Language

In what follows I formulate definitions (D), a postulate (P), principles (P), conventions (C), and assertions which are called propositions (π) because they are justified by "natural deductions" (indicated by the word "proof" written between quotation marks in order to distinguish from deductions inside a formal system). Each step is labelled by the symbol of its nature – D, P, P, C, or π – followed by the ordinal of the step. There are 19 steps, namely 15 definitions, 1 postulate and 3 principles. When a step is splitted in sub-steps a sub-ordinal is added for each sub-step. A step is often followed by comments.

I proceed by enumeration of the steps and sub-steps. The sequence is interrupted by several intermediary titles which break the progression in small groups each one of which concentrates upon a given purpose.

IV.2.1. Preparation of the concept of relative description

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 the observer-conceptor is aware of, it is the tissue of his continuity, and each one of its products becomes exterior to it as soon as it has been produced. It marks a mobile, permanent and non removable cut – a ultimate cut – between itself and the rest.

¹ Mugur-Schächter M., A: (1984) *Esquisse d'une représentation générale et formalisée des descriptions et le statut descriptionnel de la mécanique quantique*, Institut de la Méthode, Lausanne; B: (1995) *Une méthode de conceptualization relativisée: vers une épistémologie formelle apte à faire face aux complexités*, Revue Internationale de Systémique, Vol.9, No.2, pp.269-303.

² Mugur-Schächter M., (1992) *Spacetime Quantum Probabilities II: Relativized Descriptions and Popperian Propensities*, *Foundations of Physics*, Vol. 22, pp. 235-312.

³ The possibility of also another sort of mathematical formalization, more fit for calculations permitting numerical estimations – namely in terms of Hilbert-Dirac "individual" vectors (i.e. not belonging to a vector-space) – will be found in the exposition of meta-[quantum mechanics] (note 2). While in the chapter V it will become clear that the probably most natural vocation of MRC is to yield a non-mathematical formal system comparable to Russel and Whitehead's *Principia Mathematica*, but concerning conceptualization in general instead of only logic.

Comment. 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, from the start on, 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 inter-subjective consensus, such as this concept emerged from modern physics, from quantum mechanics and Einsteinian relativity. That is, inter-subjective consensus founded on systematically extracted fragments of *pure factuality* (quantum mechanics) and qualified by qualifiers explicitly constructed in order to express definite classes of relative *observational* invariance (Einsteinian relativity). 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.

Comment. This non restricted definition of "reality" refuses the disputes on "existents" (do unicorns exist ? does the number 3 exist ? does a class exist ? etc.). It will appear that inside the present approach the indistinctions entailed by this absence of restrictions generates no difficulties.

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.

Comment. In the formulation of P3, as also in D1 and D2, the specific designatum of the expression "physical reality" (that implies that a sub-realm of what is called reality is considered), is assigned the status of a primary datum. This however is *only a starting point*. In what follows the general reflexive character of MRC will manifest itself, in particular, by the fact that, progressively, a more constructed distinction between "physical" reality and reality in general will constitute itself inside MRC ⁴.

The posit P3 of existence of a physical reality might seem to be entailed by D2, so redundant, 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 consciousness functioning extract object-entities to be studied, nevertheless the various disputes concerning "existents" of this or that sort of object-entity (does Jupiter exist ?) continue steadily. The association [D2+P3] is intended as *(a)* a *memento* of the fact stressed most by Descartes and recognized by the majority of the philosophers, that, in the order of the emergence of knowledge, the assertion of the existence of physical reality *cannot* be considered to be *primary* with respect to the assertion of the existence of 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, social and economical facts, 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 generator, and which has to be explicitly specified; it will be denoted R_G . The object-entity introduced by a given generator G will be denoted α_G . For methodological reasons, a one-to-one relation is posited between a given definition of a generator G and the corresponding object-entity α_G : *that* which emerges as the product of a given G-operation, *whatever it be*, is called "the object-entity produced by G" and is labelled α_G .

Comment. 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 "linguistic" 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 – as such –, no matter whether this action is trivial or not, be *always* indicated explicitly and fully.

⁴ This specification takes into account concurrent remarks by Jean-Louis Le Moigne, Michel Bitbol, Jean-Blaise Grize, and Gérard Cohen-Solal who – independently of one another – argued that the concept of "physical reality" seemed to them neither clear *nor necessary* in a context of the nature of MRC; that inside such a context this concept should *emerge*. Furthermore, on H. Barreau's opinion, speaking of "physical" reality might erroneously suggest some confusing necessary connection with Physics, which the word "empirical" would avoid. It will however appear that the crucial definition D14.3.1 of a basic transferred description, as well as the preparatory points 8 to 13, are endowed with significance *exclusively* with respect to what is usually called physical reality, while with respect to reality in the general sense of D2 – which includes, for instance, *empirical* economic or cultural data, empirical aspects or components of what is called art, etc. – the formulations from the points 8 to 14 are *meaningless*. So I simply do not know how to avoid the assertion *ab initio* of P3 such as it is expressed above: such is the force of language. On the other hand, throughout the points 8 to 14 the concept of physical reality keeps acquiring constructed specificity. In this sense, a progressive specification of P3 *does* emerge from the evolving MRC-context, as desired by the above-mentioned colleagues, but it emerges on the basis, also, of P3 itself. So my final option is to conserve [D2+P3]. For the moment it is sufficient to understand the qualification "physical" as pointing toward anything involving an in principle definible amount of mass-energy. Then certain non-physical entities, like "art", etc., can involve physical *aspects*, while others, like the concept of the number 3, do not.

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. A generator 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 (R_G is the volume where the stone is located). 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 consisting of the dictionary (so here $R_G = \text{dictionary}$). 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 the definition D4 – of *another* generator, since it involves *another zone* R_G , and, in consequence of the one-one relation posited between G and α_G , I delimit *another* object-entity (interesting, or not, probably not, in this case). 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, with the help of a psycho-conceptual-physical creative generator, upon the spot from R consisting of the reader's mind.

The inclusion, in the definition of G , of the "zone" R_G from R where G is supposed to act, requires two important specifications.

(a) R_G is not a qualification of the produced object-entity α_G , obtained by examining *this* object-entity in order to learn about *it*. It is a condition imposed upon the operation of generation G in order to insure the location of *all* the products of G , inside a pre-decided conceptual volume indicated by some verbal label, "microstate", "chair", "program", etc. (In the particular case of a selective generation like for instance pointing toward a stone, this pre-positing conceptual volume where G has to act, might degenerate in the conceptor's mind into an identification with the physical location of the object-entity α_G : this has to be avoided). The methodological necessity of such a pre-decided conceptual location will be fully understood later, in the comment of the definition D14.3.1.

(b) The "zone" R_G from R where G is supposed to act permits of uncontrollable fluctuations concerning what is labelled α_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-predictability concerning the effect labelled α_G of an operation of generation of an object-entity. However one should clearly realize that it simply is *inconceivable* to "entirely" immobilize *a priori* the effect of G denoted α_G : this would require to specify "completely" R_G . But such a requirement is both impossible (circular) and unnecessary. One simply cannot *start* a process of representation of the way in which descriptions, i.e. qualifications of any object-entities, emerge out of R , by specifying, so qualifying R itself everywhere and for any time, and also from any point of view. Such a huge and fundamental circularity is not acceptable, and on the other hand it *cannot be realized*. While the *a priori* non-determination concerning the effect of the individual operations of generation of an object-entity, is by no means an insuperable problem or a difficulty. It simply is an unavoidable constraint that MRC is obliged to recognize, include and control. The recognition of this constraint plays an essential and very original 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. It opens up the way toward a constructive incorporation (*via* the sequence D14 of definitions of relative descriptions) of the fundamental fact called "non-determination of reference" established by the deep analyzes of Quine (ref. 13) and Putnam (ref. 14), which marks the breaking line between factuality and mere language.

(c) Consider now the one-one relation posited between a given definition of an operation G of object-entity generation and what is labelled α_G . This relation is intimately tied with the above mentioned *a priori* non-determination involved by R_G , so also with the non-determination of reference. It is important to realize that *no other relation could be uphold ab initio*. Indeed the object-entity labelled α_G emerges still non qualified *from the standpoint of the subsequently intended examinations*, if not, in general 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 and physical operation of generation (as in the case of the microstate generated by most quantum mechanical operations of state-generation). In these conditions what we called a one-one relation between a given definition of an operation G of object-entity generation, and the mere label α_G , obviously *cannot* mean that the still unqualified replicas of α_G are all "identical" in some inconceivable absolute sense.

The one-one relation posited between G and α_G amounts to just a *methodological pre-organization of the language-and-concepts*, unavoidable in order to be able to form and express a beginning of the desired representation of a human conceptualization.

Such a methodological pre-organization is, by its nature, of a *FORMALIZING* step, like an algebraic one.

Indeed 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, or think of it? 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 and notation. On the other hand, if we asserted *a priori* a "real" one-one relation between G and what is labelled α_G , we would thereby assert the sort of view that is sometimes called metaphysical realism (a God's Eye view, as Putnam puts it), which would directly contradict the very philosophical essence of the present approach. In the sequel, each time that some definite consequence of this *a priori* choice of language will appear, we shall deal with it for that definite case.

The explicitly methodological character of this constructive strategy adopted in the definition D4, is a quite crucial step. It saves premature, void, illusory questions and paradoxes that simply cannot be solved *a priori*. Instead, as it will appear, it brings forth *a posteriori* a clear, fully *relativized* operational concept of "identity" that emerges progressively in π_{12} , π_{13} and D14.1 and eventually is specifically defined in $\pi_{18.1}$; which suppresses inside MRC one of the most noxious false absolutes induced by current language. And the relativization of the qualification of identity permits then immediately to show by $\pi_{18.2}$ and $\pi_{18.3}$ that MRC, inside its *soma* structured from the progressively posited definitions, postulate and principles, eventually entails a well-defined sort of *minimality* of the realist postulate P3, initially posited without any further qualification. By this minimality the "metaphysical realism" will appear to be organically rejected by MRC.

D5. Qualifiers.

D5.1. Aspect-view. Consider a point of view for qualification (colour, coherence, etc.). Call it an *aspect* and label it by some letter or sign, say *g*. Consider a finite – so discrete – set of *n* mutually distinct *g*-qualifications. Call each such qualification a *value of the aspect g* and label it g_k , which reads *the value k of the aspect g*, in short a *gk-value*.

The aspect *g* is considered to be "defined" *if and only if*:

- (a) The specification of the values g_k of the aspect *g* is associated with the explicit specification of an effectively realizable sort of *g-examination* (physical, or conceptual (in particular formal), or mixed).
- (b) Any result of a physical *g-examination* is directly perceptible by the observer-conceptor's biological senses and mind; any result of an abstract *g-examination* is directly perceptible by the observer-conceptor's mind.
- (c) Any specification of a *g-examination* contains a procedure for deciding what result is to be announced in terms of what *gk-value*, which amounts to the specification of certain *coding-rules*.

If the conditions (a),(b) and (c) are all satisfied, the pair [*g*, { g_k , $k=1,2,\dots,n$ }] constitutes a *grid for qualification by the aspect g* that will be called *the aspect-view V_g*.

Comment. In contradistinction to the grammatical or logical predicates, an aspect-view V_g in the sense of D5.1 is strongly restricted by conditions of efficiency and is endowed with a *structure* and with coding-rules which fix a finite "gk-language" consisting of operations, signs, names, referents, and the stipulation of the relations between these. (Wittgenstein's analyses of the role of the contexts in the learning of a current language permit to apprehend the distance between a qualification in the usual sense and a qualification in the sense of D5.1).

Let us note that an order between the values g_k of an aspect *g* is *not* required but is permitted.

The distinction between an aspect *g* and the set of all the g_k values contained inside that aspect, takes into account the remarkable psychological fact that any set of g_k -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 semantic *dimension g* (a *genus*) that exceeds this set and constitutes a ground on which to place its abstract feet: every g_k -value determines a location (a specific difference) on this semantic domain *g* that grows spontaneously beneath it (for instance, if g_k labels the interior event toward which the word "red" points, this event, when conceptualized, generates the carrying semantic dimension toward which the word "colour" 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 semantic ground on which are located the ways of existing of material systems, etc.). The definition D5.1 reflects this law, on which it tries to draw the attention of the cognitivist 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 any corresponding g_k -value.

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*.

Comment. 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 g_k -values introduced by the various involved aspect-views from *V* (number of g_k -values, "position" (central, extreme) of each set of aspect-values on the corresponding semantic dimension *g*, existence or not of an order among the g_k -values of a fixed aspect *g*, a reference- g_k -value (a g_k -zero), etc.). In particular a view can reduce to only one aspect-view or even, at the limit, to one aspect-view containing only one g_k -value on its semantic 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 also 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* (concerning this language cf. note 25).

Comment. This definition can be best understood *per a contrario*. A mathematical or a logical view is not a physical view, though the involved examinations do involve certain physical actions (writing, drawing, etc.), because what is called the results of the examinations (not their material expression) consists of concepts, not just of physical entities (marks on a measuring device, for instance). (And of course, a physical view does not in the least necessarily involve Physics).

D5.4. Space-time aspect-views. One can in particular form a *space-time aspect-view* V_{ET} . Accordingly to Einsteinian 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, setting $g=E$ or $g=T$. The space-aspect E is associated with space-values or "positions" that can be denoted E_r (setting a position vector \mathbf{r} in the role of the index k introduced in D5.1) and the time-values can be denoted T_t (setting a time parameter t in the role of k). Indeed though in general the *numerical* estimations indicated by \mathbf{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, of the units for measuring intervals, the form and direction of the involved reference-axes). Any space-time aspect-view introduces an *ordered* grating of space-time values. This is a specificity with highly important epistemic consequences (refs. 15 and the chapter V2 in this work) because it endows the space-time views with the power to *strictly singularize the representation of an object-entity*.

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* and can be denoted $[CF,(G,V)]$.

Comment. 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 particular methodological reaction is a new manifestation of an already mentioned general reflexive strategy practised in MRC, of a tentative *a priori* approach that is entirely non restricted, but is systematically followed by a *posteriori* corrective restrictions.

An observer-conceptor $[CF,(G,V)]$ 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 α_G generated by G , never reveals to the involved observer-conceptor some value g_k of the aspect g , we say that *the object-entity α_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 α_G , or that α_G and V_g do not mutually exist)⁵.

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

Comment. The definitions of relative inexistence or existence can be transposed in an obvious way to one single value g_k of an aspect g , or to a whole view V .

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 descriptonal aims, which are induced by a tentative pairing (G,V_g) or (G,V) . These concepts are essentially semantic.

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. Furthermore, the concepts of relative inexistence and existence permit to cancel *a posteriori*, among all the initially only tentative pairings (G,V_g) or (G,V) that an observer-conceptor has introduced, those which appear to be non-significant; while the other pairings can be kept and put to systematic descriptonal work. The possibility of such a selection illustrates again the general reflexive strategy of MRC: maximal *a priori* freedom followed by *a posteriori* controls and restrictions.

The concepts of relative inexistence and existence have quite fundamental consequences, but with respect to which the classical conceptualizations are more or less blind. This generates various sorts of false problems and paradoxes. Formal logic for instance, because it is posited to concern exclusively the qualifications of mutual consistency

⁵ 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 (accidents being neglected). Of course during a more realistic sort of tentative research a mutual non-pertinence can be much less apparent *a priori* than in this caricatured example.

(confusingly called sometimes formal truth), decidability concerning consistency, and formal completeness, banishes the semantic concepts of relative existence. But, surreptitiously, *via* the fact that often the axioms from a formalized representation of some domain of reality are *considered as empirically true assertions, as "propositions"*, empirical truth goes back into the formal systems, and factual truth, in order to be defined, requires mutual existence as a preliminary condition. This, according to MRC, is intimately tied with the non-decidability paradoxes, and leads to certain reservations even with respect to Gödel's proof of non-decidability, though non-decidability itself, as defined for formal systems, *follows* inside MRC, by a specific chain of arguments (cf. V.2).

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

Consider a *physical* object-entity α_G that can be (or is conceived to have been) generated by some definite physical generator of object-entity, G. This entity α_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 α_G would be devoid of foundation (content)).

The frame-principle FP asserts the following.

- If the physical object-entity α_G does exist in the sense of D7 with respect to the physical aspect-view V_g , then *ipso facto* α_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 α_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 where $g \neq ET$: *the space-time views are frame-views which, alone, are blind, they cannot "see" nothing.*

- According to what precedes what is called "physical space-time" *cannot* be regarded as a physical object-entity α_G . Indeed the assertion posited in the first part of this principle does *not* apply to what is called "physical space-time": the designatum of this expression *itself*, considered strictly *alone*, is non-existent in the sense of D7 with respect to *any* physical aspect-view V_g where $g \neq ET$, and it is equally non-existent with respect to any association of such a physical aspect-view, with a space-time aspect-view. In this sense:

What is called "physical space-time" is – itself – only the locus of all the possible space-time frame-views (referentials), the genus of these. It is the conceptual volume where physical entities, facts or aspects, can be assigned space-time specifications which, if this is desired, can be numerically defined by the use of space-time referentials.

Comment. The frame principle FP adopts, transposes in terms of MRC, and specifies, the Kantian conception according to which man is unable to conceive of physical entities outside physical space-time, that he introduces as *a priori* "forms of the intuition" inside which he casts all his representations of physical entities. FP isolates and stresses certain particular implications of this Kantian conception which so far seem to have remained insufficiently noticed by physicists. 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 phenomenal appearance which he connects with what he conceives to be a physical entity α_G , *ipso facto* introduces more or less explicitly:

(a) a space-time frame-aspect-view V_{ET} (the observer-conceptor's body tends to yield – vaguely – the intuitive origin, the units, and – variable – directions of the axes, whereas in the technical or scientific approaches these are explicitly and freely specified, in a precise and stable way, in a mathematical language, an integral or a differential mathematical language);

and furthermore

(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 α_G does exist in the sense of D7, and the values gk of which he combines with the value-indexes E_r and T_t of the space-time aspect-view V_{ET} (in mathematical terms, with the space-time coordinates yielded by V_{ET}). J. Petitot (ref. 5A, p. 216) writes concerning Kant's conception on space and matter:

"As quality (not as quantity any more), matter is *filling* of space. This filling is very different from a mere "occupation" (anti-Cartesianism). It is a dynamical and energetical process characteristic of the substantial "interiority" of matter."

In P8 the necessity of the presence of at least one physical aspect g different of the space or time aspects, is a way of expressing *the presence of the matter which fills the space-time, and of asserting that any phenomenal manifestation to human minds stems from this matter, not from space-time itself*; of asserting that

(c) by the help of a space-time frame-view *alone*, in the strict absence of any other sort of physical aspect-view V_g (colour, texture, whatever) man is unable to perceive or even to imagine a physical entity. He simply is unable to extract it from the background of exclusively space-time frame-qualifications which, by themselves, act exclusively as elements of a *grid of reference* inserted in an abstract, void *container* labelled by the words "physical space-time". By themselves these elements from a grid of reference act exclusively as potential land-marks that can be "activated" only by the values of some other aspect $g \neq ET$.

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* by construction to this or that space-time frame-aspect-view, on the integral level *or on the infinitesimal differential level*, on the basis of some definite (even if implicit) descriptorial aim (this is discussed in the last chapter of this work).

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 space-time mutual exclusion. Consider a *physical* object-entity α_G corresponding to a physical generator G . Let V be a *physical* view with respect to which α_G does exist in the sense of D7, involving two distinct physical aspect-views V_{g1} and V_{g2} as well as a space-time view V_{ET} (accordingly to C.9). The *principle of individual space-time mutual exclusion* posits the following.

- Any physical examination involved by V quite systematically *changes* the state of the examined physical object-entity α_G , even if only to a degree which in this or that context can be neglected: the state of a physical object-entity 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 α_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 α_G – then it is not possible to perform both these two sorts of examinations simultaneously upon a *unique* replica of α_G produced by only *one* realization of G (the word «individual» from the denomination of P10 refers to this crucial unicity of the involved replica of α_G).

If the type of impossibility specified above manifests itself, the two physical aspect-views V_{g1} and $V_{g2} \neq V_{g1}$ are said to be mutually *incompatible*. In the alternative case V_{g2} and V_{g1} are said to be mutually *compatible*.

Comment. It is probably possible to show that P10 is entailed by (reducible to) the assertion of *other* more basic space-time mutual exclusions (or from some ultimately basic space-time mutual exclusions, non-reducible to still more basic ones) (an attempt has been made in ref. 22 B, 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 P10 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. 16). 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* given replica of the considered microstate, of two mutually incompatible quantum mechanical measurements.

The concept of incompatibility of two physical aspect-views is defined only with respect to one individual replica of some given physical object-entity: it is not intrinsic to these physical aspect-views.

This is of crucial importance from a logical point of view (cf. V.1.2)

π 11. Proposition. Consider a physical object-entity α_G corresponding to a generator G and a *physical* view V with respect to which α_G does exist in the sense of D7. In general, in order to perform upon α_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 *successions* [(one operation of G -generation of α_G), (one operation of V_g -examination of that replica of α_G)] (in short $[G.V_g]$) containing (at least) one such pair for each physical aspect-view V_g from V .

"Proof". In order to achieve examinations of α_G *via* mutually incompatible physical aspect-views V_g from V , the operation G of generation of α_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.

Comment. 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, entails in general the condition of reproducibility of all the involved pairs $[G.V_g]$ (either in succession or in simultaneity), thus involving a whole set of replicas of the involved sort of object-entity α_G . (The proposition $\pi 11$ and its "proof" admit of generalization to also certain *conceptual* referentials (G,V)).

$\pi 12$. Proposition. Consider a physical object-entity α_G corresponding to a given generator G , and one given *physical* aspect-view V_g with respect to which α_G exists in the sense of D7. When a succession $[G.V_g]$ is repeated a big number N of times (the time parameter being re-set for each pair to its initial value t_0) or when it is simultaneously realized on a big number of replicas of the object-entity α_G , it is not impossible that the same observable gk-space-time-values be found in each instance; in such a case one can say that an *individual qualificational N-stability* has been obtained. But in general this does not happen: in general the N obtained gk-space-time-values are *not* all identical, notwithstanding that in each realization of a pair $[G.V_g]$ the operations G and V_g obey strictly the same defining conditions.

"Proof". This follows *per a contrario*: to posit *a priori* that the results produced by repeated realizations of a given succession $[G.V_g]$ 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 factually *true*. To show this last point it is sufficient to produce a counter-example. Consider an object-entity generator G which acts by definition on a zone R_G from R consisting of a piece of land, and that delimits there the object-entity α_G consisting of a definite area of one square kilometre. Let V_g be an aspect-view (structured accordingly to D5.1 and C9) that permits to establish the aspect $g \equiv$ [association of mean-colour-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 succession $[G.V_g]$ in general yield two different results, even though both G and V_g satisfy each time to the same operational commands.

Comment. Notice that if an individual qualificational N -stability *is* found for a given succession $[G.V_g]$, this does by no means exclude the possibility that in another series of N' repetitions (with N' bigger or smaller than N) no individual stability be found any more.

Furthermore, and this is more important, if for a given object-entity α_G corresponding to a given generator G , an individual N -stability with respect to the examinations by a given aspect-view V_g *is* found, this does by no means involve that for the same object-entity α_G but another aspect-view $V_{g'}$ with $g' \neq g$ one will find again some individual stability for some big number

The individual stability of the qualifications of an object-entity α_G or the statistical character of these, are relative to the qualifying aspect-view V_g .

It is utmost important to realize 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 sequence $[G.V_g]$ 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 which – factually – is always endowed with strict singularity (this probably holds even for a conceptual object-entity, like, say, the number 5, if its mental correspondent in a given mind is considered). As for "identity" in *absence* of *any* view – which, as many do in fact surreptitiously and vaguely imagine, would mean identity of α_G with *itself* from one realization of G to another one, not of the qualification of α_G *via* V_g when the succession $[G.V_g]$ is repeated –, it is but an illusory concept tied with the quest for an impossible absolute objectivity of the thing-in-itself. (The psychological difficulty encountered for realizing this stems from the physical, "exterior" nature supposed for α_G , which surreptitiously inclines to posit that – like α_G itself – the *qualifications* of α_G also exist independently of any observer-conceptor, as "properties" of α_G).

The above considerations bring back to the only methodological meaning which can be *a priori* assigned to the one-one relation posited between G and α_G , and, correlatively, they bring back to also the roots of the non-determination of reference.

Notice that all the preceding assertions acquire inside MRC a deductive character, in the sense of the sort of natural logical construction practised here (i.e. outside any formal system). Which is a quite non-trivial feature of MRC, manifesting already the (qualitative) formalized features with which we are progressively endowing it.

$\pi 13$. Proposition. Given an epistemic referential (G,V_g) where both G and V_g involve *physical* operations, in general no stability at all is insured for the gk-space-time values obtained by repeated or multiple realizations of the succession $[G.V_g]$, neither on the individual level of observation, nor on the statistical one.

"Proof". If only a maximal, an individual N-stability is considered, i.e. identity of all the N groups of observable gk-space-time values corresponding to N realizations of a succession $[G.V_g]$, then $\pi 13$ becomes a mere repetition of $\pi 12$, hence the "proof" of $\pi 12$ still works. But suppose that no individual N-stability has been found, i.e. that a whole statistical distribution of dispersed triads of gk-space-time-values has been found. Then it still remains *a priori* possible that a big number N' of repetitions of a series of a big number N of repetitions of the succession $[G.V_g]$ ($N' \neq N$ in general), shall bring forth, when N' is increased toward infinity, a convergence in the sense of the theorem of big numbers, of the relative frequencies of occurrence, in the mentioned statistical distribution, of the dispersed triads of gk-space-time-values. In this case one can speak of a *probabilistic (N,N')-stability*. However, up to some given arbitrary pair (N,N') of big numbers, 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. Nothing excludes the possibility of such a situation, neither some previous MRC-assumptions, nor the empirical experience. If this negative situation does realize indeed, then only two solutions are left: either one continues the search with pairs of increasingly bigger numbers N, N', or one stops at some given pair (N,N') and announces *a posteriori* that, even though G and V_g do mutually exist in the sense of D7, their pairing (G,V_g) has nevertheless to be (N,N')-cancelled from the subsequent conceptualization, because, while no individual N-stability has been observed, this pairing does not generate a probabilistic (N,N')-stability either; *tertium non datur* because apart from an individual or a probabilistic stability, no other sort of still weaker stability has been defined so far (in V2 this question is treated more thoroughly). Anyhow, for *any* given pair of big numbers (N,N'), it is quite possible that no stability at all be found for the results of repeated successions $[G.V_g]$. Which establishes $\pi 13$.

Comment. The "proof" of $\pi 13$ does by no means exclude the possibility that, if the succession $[G.V_g]$ does produce a probabilistic (N,N')-stability, another succession $[G.V_{g'}]$ with G the *same* but with $V_{g'} \neq V_g$, shall produce qualifications that are endowed with some *individual* N-stability, or with no stability at all, neither probabilistic nor individual:

The existence of a probabilistic stability of the qualifications of a given object-entity α_G is relative to the qualifying aspect-view V_g just like the existence of an individual stability. The nature – individual or probabilistic – of the stable qualifications of a given object-entity α_G , is relative to the qualifying aspect-view V_g just like the existence of stable qualifications.

IV.2.2. The normed concept of relative description

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 α_G ; V is a *physical* view with m aspect-views V_g with respect to each one of which α_G does exist in the sense of D7; and, as required by P8 and C9, V contains also a space-time view V_{ET} introducing an *ordered* space-time grating (D5.4). Furthermore consider, for *each* V_g from V, a big number N of realizations of the corresponding sequence $[G.V_g]$, in simultaneity or in succession, the time parameter being re-set at the same initial value t_0 for each realization of a sequence $[G.V_g]$.

Suppose first that, when the succession $[G.V_g]$ is realized N times, for *each* aspect-view V_g from V, *identical* outcomes of the corresponding configuration of gk-space-time-values are obtained, i.e. only *one* same "individual" result appeared N times. We shall then say that an *N-individual* outcome has been obtained (the reference to N is necessary because nothing excludes that for another sequence of successions $[G.V_g]$ some dispersion be found). The set of N-individual configurations of gk-Er-Tt-values corresponding to *all* the m distinct aspect-views V_g from V, constitutes in the abstract representation space of V ordered by the space-time grating introduced by V_{ET} , a definite "form" of gk-Er-Tt-values. This "form" will be called an *N-individual relative description, with respect to V, of the physical object-entity α_G* , (in short an individual relative description) and it will be indicated by the notation ${}^N D/G, \alpha_G, V/$ to be read «the description relative to the triad G, α_G, V and to N» (in current usage the index N, supposed to be big, will be dropped). The individual relative description $D/G, \alpha_G, V/$ defined above can also be regarded as the set of all the individual *relative-aspect-descriptions* $D/G, \alpha_G, V_g/$ with $V_g \in V$.

Suppose now that, when the various successions $[G.V_g]$ with $V_g \in V$ are realized N times, *not* all the successions $[G.V_g]$ are found to reproduce identically one same configuration of gk-Er-Tt-values; that at least for one $V_g \in V$ (not necessarily for all) the corresponding succession $[G.V_g]$ produces a whole set $S_{g_i} = \{c_{g_i}\}$ of mutually distinct, dispersed configurations c_{g_i} of gk-Er-Tt-values, (with $i \in I$ and I a finite index-set, to preserve the finitistic character of this approach); but that, for *any* succession $[G.V_g]$ which produces dispersed results, when N is increased toward infinity, the relative frequency $n(c_{g_i})/N$ of occurrence of *each* configuration $c_{g_i} \in S_{g_i}$ converges toward a corresponding probability p_{g_i} . In these conditions each configuration $c_{g_i} \in S_{g_i}$ will be called an *elementary-event-description* corresponding to the

succession $[G.V_g]$ with $V_g \in V$ and it will be denoted $D_p(g_i)/G, \alpha_G, V_g/$. The epistemic referential (G, V) will be said to produce a *probabilistic relative description* of the physical object-entity α_G which will be denoted $D_p/G, \alpha_G, V/$ ⁶.

Comment. The definition D14.1 is the core of MRC. It finally assigns a *significance* to what has been called a physical object-entity α_G . A significance which, though it is relative to a view V and in certain "basic" conditions that will be specified in D14.3.1 is far from being fully "satisfactory", nevertheless is now quite definite *and* endowed with communicability. Whereas G alone cannot systematically insure for " α_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.

D14.1.1. Reference and relative meaning. In any case of qualificational stability, individual or probabilistic, we shall say that α_G is the reference of $D/G, \alpha_G, V/$ while $D/G, \alpha_G, V/$ – as perceived by the acting observer – is, for that observer, the meaning of α_G relatively to V .

Comment. It thus appears that the initial methodological assertion of a one-one relation between a given definition of an operation G and its result labelled α_G , does not hinder the subsequent construction of all the necessary specifications. On the contrary, it founds them.

Furthermore, while the "description-problem" (given (G, α_G, V) find the corresponding description $D/G, \alpha_G, V/$) possesses a quite definite solution, the inverse "problem of reference" (given a description $D/G, \alpha_G, V/$, determine the referent α_G and the view V which generated it) is in general insoluble (Wittgenstein, concerning the available descriptions of the dressing that Edward II wore during the ceremony of his crowning, remarks precisely this, though of course in other terms).

The following is also worth being noted.

The condition of existence of individual or probabilistic stability of the outcomes of the successions $[G.V_g]$, with respect to repetitions of these, presupposes the possibility to achieve arbitrarily many successions $[G.V_g]$, for all the $V_g \in V$.

This is a strong restriction. But when it is insured it extracts out of temporality the concept of "description" founded upon it and it puts it directly on highways of communicability where reference, meaning, and objectivity in the sense of intersubjective consensus, can most immediately be attained. Furthermore, it sets a standard with respect to which relaxing generalizations can be now defined.

D14.2. Two generalizations of D14.1.

D14.2.1. Relative description of a non-physical public object-entity. Let us suppress in the definition D14.1 the restriction to physical generators, while *excluding* generators that act on only one individual inner universe (there, in general at least, the sequences $[G.V_g]$ cannot be repeated (in succession or in simultaneity) and so the condition of stability of their results cannot be insured). Thus relaxed, the definition D14.1 enlarges to object-entities from the non physical but public, exterior reality (economical, social) for which the repeatability of sequences $[G.V_g]$ and the condition of stability of their results still do make sense. The new sort of description obtained in this way will be called a *relative description of a non physical and public object-entity* and it will be indicated by the notation $(NPP).D/G, \alpha_G, V/$, in short $(NPP).D$.

Comment. The generalization D14.2.1 holds in particular concerning any already accomplished *description* in the sense of D14.1, selected as a new, always *conceptual* object-entity, to be examined in a subsequent description *via* some new view. Thereby:

The definition D14.2.1 opens up specifically and explicitly the whole crucially important sub-realm of R consisting of a stabilized communicable *conceptual* reality.

In the case of non-physical object-entities that admit of a description in the sense of D14.2.1, any reference to the frame-aspect of ("physical") *space* can obviously be dropped, and so the obtained relative description amounts to a "form" of only gk -time values. If moreover it appears that the considered description can be regarded to be independent also of time values, (as for instance in the study of a fixed formal system), the reference to the frame-aspect of time can be equally dropped. (For instance, the dependence on time cannot be dropped 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 (information's, understanding,

⁶ This definition of a probabilistic description is incomplete and simplifying. It will be thoroughly reconstructed and completed in V2. A more ancient but full treatment can be found in the reference 23. In this stage of the development of MRC we are obliged to introduce it in this unachieved form, as a provisional support for essential distinctions that cannot be postponed.

modalities of verification, etc.) available to the acting observer-conceptor at the considered time; 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). Consider then a relative description where both the space qualifications and the time-qualifications can be dropped. If no one among the involved aspects g introduces by its own definition an order (cf. D5.1), this description consists of one or several *non-ordered* but *stable* configurations of gk -values. What does this mean? It means that the involved non-ordered configurations are characterized by some *correlations*, which are stable with respect to repetitions of the sequences $[G.V_g]$ permitted by the view V , i.e. a given gk -value is found to be associated with this or that other $g'k'$ -value ($g' \neq g$ or $k' \neq k$ or both), always, or *never* (which is as strong a correlation as always), or with this or that probability.

D14.2.2. Relative testimony. Take again as a starting point the strong definition D14.1, and suppress now in it both the restriction to only a physical generator of object-entity *and* the condition of repeatability of the sequences $[G.V_g]$ for the V_g from V . What becomes of D14.1? It reduces to a mere set of "qualifications" generated by a definite epistemic referential. Indeed as soon as an epistemic referential (G,V) is given and the condition D7 of mutual existence is satisfied for the pair (G,V) , qualifications *via* V can arise for the object-entity α_G produced by the generator G . From now on any structure of such qualifications will be called a *relative testimony* and will be denoted $\theta/G,\alpha_G,V/$, in short θ .

Comment. The generalization D14.2.2 of D14.1 gives a definite status inside the MRC-language to all the qualifications of *unique* object-entities of *any* nature. In the case of physical object-entities, uniqueness is often intimately connected with space-time singularity in particular with the principle P10 of individualizing space-time mutual *exclusion*. This will come out to have a surprising importance in the identification of the characteristics of the deepest stratum of an MRC-logic (V.1.2).

Furthermore D14.2.2 introduces in the MRC-language all the qualifications of psychical events from the inner universe of a conceptor-observer.

This is a huge inclusion that lays down a foundation for the future research of a clear connection *in MRC-terms*, between introspective reports and neurological facts. Which might lead to comparability of the MRC requirements on this sort of connection, with important new views on body *versus* mind, like those of Edelman (ref. 7), Changeux (ref.6), Damasio (ref.8), and more generally with the whole avalanche of results continually produced in the cognitive sciences.

Thereby the problems of reference and truth that haunt this vast recent domain might find the conceptual framework for a guided approach.

Finally, the relative testimonies in the sense of D14.2.2 permit to take into consideration the historical descriptions, the poetical ones, etc. For these the fundamental concepts of reference and truth still remain wide open for discussion and for methodological organization.

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 *in the sense of D14.1* where:

- The generator consists of a physical operation and it produces a physical object-entity that cannot be perceived directly by man. 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 will be denoted $\alpha^{(o)}$ (a simplified notation standing for $(\alpha_G(o))^{(o)}$).
- The view able to draw phenomenal manifestations out of a basic object-entity is necessarily such that the phenomenal content of each gk -value of each involved aspect g consists of features of a material device for gk -registrations, biological or not, but which always is *different from the studied object-entity*, these features emerging as "marks" produced by the interactions between the registering-device and replicas of the considered basic object-entity. These marks acquire *significance* by their coding in terms of values gk of the aspects from the acting view. A view of the just specified kind will be called a *basic transfer-view* (in short a basic view) and will be denoted $V^{(o)}$. The aspect-views from $V^{(o)}$ will be called basic aspect-views and will be denoted $V_g^{(o)}$.
- The epistemic referential $(G^{(o)},V^{(o)})$ will be called a *basic epistemic referential*.
- A relative description in the sense of D14.1, individual or probabilistic, achieved with a basic generator and *one* basic transfer-aspect-view $V_g^{(o)}$, will be called a *basic transferred relative aspect-description* and it will be denoted $D^{(o)}/G^{(o)},\alpha^{(o)},V_g^{(o)}/$.
- A relative description in the sense of D14.1, individual or probabilistic, achieved with a basic generator $G^{(o)}$ and a basic transfer-view $V^{(o)}$ involving at least two *mutually incompatible* basic aspect-views $V_{g_1}^{(o)}$ and $V_{g_2}^{(o)}$, will be called a *basic transferred relative description* (also, in short, a basic description or a transferred description) and it will be denoted $D^{(o)}/G^{(o)},\alpha^{(o)},V^{(o)}/$ (in short $D^{(o)}$).

- A basic transferred description $D^{(o)}/G^{(o)},\alpha^{(o)},V^{(o)}$ is posited to *characterize* observationally the involved object-entity $\alpha^{(o)}$, which means by definition that it is posited that no other operation of generation $(G^{(o)})\neq G^{(o)}$ can be found which, associated with the same basic view $V^{(o)}$, produces the same basic transferred description.

Comment. It is difficult to fully grasp the meaning and the importance of the concept of basic transferred relative description. But it is crucial to grasp it fully. Indeed it is by *this* concept that MRC penetrates beneath natural language and the forms of thought involved by it, establishing a definite relation between conceptualization and physical factuality. Therefore I shall comment on it in detail, even redundantly.

To begin with, let us stress that a basic physical object-entity produced by a basic physical operation $G^{(o)}$, if furthermore this sort of object-entity has *never* before been qualified *via* any transfer-view $V^{(o)}$ whatever, emerges still entirely unknown *in terms of the knowledge researched concerning it specifically*, notwithstanding that the operation of generation $G^{(o)}$ *does* singularize it out of the whole of reality. Indeed – factually – the result labelled $\alpha^{(o)}$ is entirely "specified" by $G^{(o)}$, it is "defined", since it can be held available for any possible subsequent examination and, accordingly to the posited one-one relation between the operation $G^{(o)}$ and its result $\alpha^{(o)}$, it can be deliberately reproduced. More. Factually, each such result emerges from the operation $G^{(o)}$ that produced it, *fully* individualized, 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 individualized in *another* manner than that in which knowledge concerning it specifically, is researched; namely in only a factual physical sense, not an already conceptualized, qualifying sense. It is true that the specification of the generation operation $G^{(o)}$ involves necessarily some position of a pre-decided *conceptual* space of qualification (tied with the "zone" R_G from R where G is supposed to act (cf. D4 and comment on it). By its definition $G^{(o)}$ drops its products inside this pre-decided conceptual volume. That what is labelled $\alpha^{(o)}$ is pre-constrained to emerge inside this or that space-time domain where $G^{(o)}$ acts, it is produced so as to correspond to some definite verbal designation ("a manifestation of stellar life", or "a state of a microsystem", etc.). In this sense $G^{(o)}$ and its result labelled $\alpha^{(o)}$ might be considered to never be "purely" factual. But:

The preliminarily *posited* conceptual volume where the operation $G^{(o)}$ drops all its products, cannot be equated to the *new* knowledge that is *researched* concerning these products. The elaboration of this new researched knowledge is the task left by construction for examinations achieved *subsequently* upon the already produced $\alpha^{(o)}$, *via* this or that basic aspect-view $V_g^{(o)}$ that exists in the sense of D7 with respect to – non specifically – anything lying inside the pre-decided conceptual volume where $G^{(o)}$ drops all its products.

It is important to realize that the specification of the operation $G^{(o)}$ of generation of an object-entity *must* contain a conceptual receptacle attached to the physical action involved by $G^{(o)}$; a conceptual receptacle to be lowered with this action into the depths of pure as yet non-conceptualized physical factuality, in order to receive inside it the results of the operation $G^{(o)}$ so as to be able to hoist them up into the stratum of the concepts-and-language. This is an unavoidable condition because *only* a receptacle made of concepts-and-language can hoist up into the thinkable and speakable a lump of pure factuality. A macroscopic operation $G^{(o)}$ can be itself shown, taught, repeated, and also said. But if nothing thinkable and speakable were posited concerning what $G^{(o)}$ produces, which by hypothesis is not perceivable, then this, the product, even if factually it has been produced, would simply stay out of conceptualization. While human mind, in order to be able to *think* about a non perceivable thing, needs, not only to have labelled it by a repeatable operation of generation and by a notation, but furthermore to have endowed it with some initializing conceptual status, with at least some approximate preliminary speakable location inside the unending and infinite-dimensional space of concepts ⁷.

But of course a basic description $D^{(o)}$ does not *indefinitely* produce an object-entity $\alpha^{(o)}$ that is still unknown, specifically and precisely in the desired terms. Knowledge about $\alpha^{(o)}$ is a subjective and moving character. Think of a basic description that is repeated by the observer-conceptor X after having produced for him the desired knowledge concerning $\alpha^{(o)}$: then, even though $\alpha^{(o)}$ is generated by the same generator $G^{(o)}$ and emerges beneath the level of the directly observable by man, it is nevertheless already known by X (while for another observer-conceptor it can be strictly unknown, even if the knowledge acquired by X has been made socially available in public registration devices (apparatuses, catalogues, books, etc.).

The only specific and perennial features of a "basic" description $D^{(o)}$ and of what is here called a "basic" object-entity $\alpha^{(o)}$ stem from the constant character of the involved referential, a "basic" referential $(G^{(o)},V^{(o)})$ where

⁷ It was Evelyne Andreewsky who, by repeated questions and remarks, incited me to specify how, exactly, the *pre-existing* conceptualization and the descriptonal *aims* act upon the extraction of new knowledge out of as yet unconceptualized physical factuality.

$G^{(o)}$ works on the physical factuality and $V^{(o)}$ is a transfer-view as specified in the definition D14.3.1: it resides in the fact that what is called a basic description $D^{(o)}$ consists by definition of *exclusively* features imprinted upon registering devices that are all different from the studied object-entity $\alpha^{(o)}$ itself.

Consider now the following question which is fundamental for the MRC treatment of reference: does indeed the definition D14.3.1 of a basic description open up a way toward a communicable characterization of – specifically – the basic object-entity $\alpha^{(o)}$? The final posit from D14.3.1 concerns this question. Consider a basic *aspect*-description $D^{(o)}/G^{(o)},\alpha^{(o)},V_g^{(o)}$ (the basic view consists of only one basic aspect $V_g^{(o)}$). In this case it seems clear that $D^{(o)}$ does *not* yield a characterization – individual or probabilistic, no matter, but specifically and isolately – of what is labelled $\alpha^{(o)}$, since it points toward observable manifestations brought forth by interactions between $\alpha^{(o)}$ and a material device for gk-registrations. Which changes what was labelled $\alpha^{(o)}$ (P10) and produces perceivable results that depend on the device for gk-registrations as much as of $\alpha^{(o)}$. But what about a "binocular" basic description $D^{(o)}$ where the basic view $V^{(o)}$ consists of two mutually incompatible basic aspect-views $V_{g1}^{(o)}$ and $V_{g2}^{(o)} \neq V_{g1}^{(o)}$? In quantum mechanics, for the particular case of a basic object-entity that is a state of a microsystem, it is (implicitly) admitted that, together, two quantum mechanical descriptions of a same microstate *via* two mutually incompatible quantum mechanical views, characterize that microstate. Which means only that no other operation ($G^{(o)} \neq G^{(o)}$) of generation of a microstate can be assumed to yield both these same two quantum mechanical descriptions. The final posit from D14.3.1 generalizes inside MRC the above-mentioned quantum mechanical implication. It would be satisfactory of course to found this posit upon a constructed argument (for instance a *reductio ad absurdum*). But so far I did not succeed to find one. So I introduce the condition as just a supplementary security for the solidity of MRC). This completes now 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 necessity of a complement of this type can be best understood *per a contrario*. In the absence of any phenomenal, specific, normed, communicable set of qualifications associated specifically with what has been labelled $\alpha^{(o)}$, one would have to regard " $\alpha^{(o)}$ " as just a label that labels nothing distinct from this label itself. Then speaking and thinking of "what has been labelled $\alpha^{(o)}$ " would be only a void sophistic trick, amounting to arbitrary implicit postulations⁸. 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, attesting intimate couplings and transmissions which somehow manage to emerge between them.

The posit from D14.3.1 incorporates into the MRC-representation the assertion of a definite way in which a basic object-entity produced by a basic generator $G^{(o)}$ inside pure physical factuality, *can* be conceived to be captured there and then hoisted up into the conceptual net of inter-subjective knowledge: it is that what produces a pair of sets of mutually incompatible observable manifestations which – accordingly to the final posit from D14.3.1 – cannot be obtained by the use of any other operation $G^{(o)} \neq G^{(o)}$.

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, then it reached it *first* by some transferred descriptions. We remain unaware of this because usually the phenomenal appearance of the gk-values involved in these transferred descriptions stems from marks imprinted directly upon the biological domains of sensitivity of the observer's body which act at the same time as generators of object-entity and as views in the sense of MRC. So the involved epistemic referentials are of a nature which, with respect to the general MRC-descriptive mould, is particular and degenerate (cf. the global comments on D14, the comments on D19.4, V.1.1 and V.1.2). This entails the following effects which occur all at the same time and beyond any control of logical consistency:

(a) It hides the transferred character of the marks.

(b) It 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 realizing the possibility and the universal methodological value of two radically distinct epistemic stages which, in general, have to be both active during a deliberate achievement of "unnatural" transferred descriptions, like those on which quantum mechanics throws light!).

(c) It pushes surreptitiously toward ontological absolutizations. Indeed one encounters severe difficulties to realize that the (various) 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-way-in-which-the-chair-in-itself-really-is"; that nothing, never, will be able to prove that this or that model of a chair "exists" independently of any perception, of any view. More, that such an instinctive

⁸ Putnam's thought experiments concerning the non-determination of reference (ref. 14) are very suggestive in this respect.

hope contradicts both philosophy and logic, since in the absence of any view the very concept of description, and even that of merely an isolated qualification, vanishes (cf. $\pi 18$, D19.1, D19.2). It is really hard to withstand the irrepressible trend toward identification of our spontaneous modellings stemming from descriptions transferred on the human biological registering devices, 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, Wittgenstein, Putnam, have founded famous analyses on the explicit recognition of this fact.

But, and this is noteworthy, as soon as the transfer-view from a considered basic transferred description $D^{(o)}$ 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 $D^{(o)}$ involves marks registered on devices that are exterior to the observer's body (as it happens indeed for microstates), it suddenly becomes quite clear that a basic description $D^{(o)}$ itself constitutes a constructed intermediary object-entity which relays the access of the basic a-conceptual object-entity $\alpha^{(o)}$, to the observer-conceptor's consciousness-functioning; that phenomena are not always independent of aimed volition, that they are not always just psycho-physical facts which emerge spontaneously, but might have to be planned and produced by method. 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 $\alpha^{(o)}$, and the subsequent stage of creation of observable manifestations drawn from $\alpha^{(o)}$ 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.

The basic object-entity $\alpha_G^{(o)}$ from a transferred description $D^{(o)}$ roots this description directly into the physical factuality. Correlatively the transferred description $D^{(o)}$ achieves for the involved basic object-entity $\alpha_G^{(o)}$ a very first passage from pure physical 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. So the basic transferred descriptions are the *local zero-points* of the chains of conceptualization, in the following sense. Each basic transferred description $D^{(o)}$ starts from a conceptual situation where, though a conceptual environment of the basic object-entity $\alpha_G^{(o)}$ (genus, etc.) always is more or less explicitly posited *a priori* (at least *via* the definition D4 of $G^{(o)}$), nevertheless nothing is known concerning $\alpha_G^{(o)}$ *specifically*.

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 phenomenal appearances in the Kantian 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 phenomenal appearances" in Kant's sense (II.3) begins by the construction of transferred descriptions, of which $D^{(o)}$ yields a form that is **normed**. Which amounts to a **formalization** of the structure of the connections between knowledge and Being.*

This is a quite fundamental contribution of MRC to epistemology. It separates the volume of the known, in two essentially different strata. Indeed the whole rest of the available knowledge consists only of subsequent developments of this first – evolving – stratum of transferred descriptions which operate the very first connections between Being and knowledge: namely, it consists of space-time modelizations which endow the basic transferred descriptions with the features required by the frame-postulate P8, thus insuring for them an "intelligibility" of which initially they are devoid. A *non limited* succession of descriptonal complexifications can then indefinitely improve these space-time modelizations (cf. D16, D.19, and all the involved discussions).

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 just 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, for this example, it displays all the stages of the rooting. MRC recognizes the universality of this rooting and extends it to any sort of physical factuality, re-expressing it in general and *normalized* terms.

D14.3.2. Basic description of a psychical object-entity? Notwithstanding important difficulties (the non pertinence of the repeatability of the successions $[G^{(o)}.V^{(o)}]$ and of the stability of their results), it might turn out to be possible to forge a useful concept of basic description of "psychical basic object-entities $\alpha^{(o)}$ ", by some combination of testimonial descriptions θ in the sense of D14.2.2, with "biological basic transferred descriptions". Thereby I mean a *conscious* but *not* yet conceptualized psychical object-entity, a *primeity* in the sense of Peirce that emerges in the acting observer-conceptor's *interior* universe, and, though perceived, is still entirely *unknown*, non-qualified (A. Damasio (ref. 8) has elaborated a very subtle structure of concepts-and-facts concerning events of this sort). Think for instance of all the feelings of mere *existence* of an inner fact of which one becomes suddenly aware strictly without knowing as yet explicitly what and how they are, so *a fortiori* without understanding them; think of the genuine *research* conducted by Proust in order to identify the subjective *meaning* of such feelings; think also of the psychoanalytic methods which deal with features as if transferred upon behavioural "devices" (reactions, ways of acting, feelings) by interactions between a hypothetical entirely unknown inner configuration, and various accidental or systematically arising exterior

circumstances; this hypothetical inner configuration is precisely what the therapies try to first somehow delimit "operationally" (by analyses of dreams, associations, etc.) – even if by *creating* it– and then to interpret, qualify, and control or suppress. The obtained description *is* then in a certain sense precisely what seems to deserve being called a basic relative description of a psychical object-entity.

It is however clear that for the moment these are just conjectures. The central concept of basic transferred description has an indisputable pertinence only with respect to physical object-entities.

Global comment on the definitions D14. 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 $D/G, \alpha_G, V/$ stresses that any description that is normed in the sense of MRC brings into play a triad G, α_G, V to which it is essentially relative: this is the general descriptive mould induced from quantum mechanics and required now for any description, whether it is basic, 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 basic 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, the operation of generation of the desired object-entity is often accomplished without any difficulty, in a spontaneous or even implicit way (think of descriptions of conceptual entities, like a definition, etc.). While when the transfers occur on – directly – the biological sensorial apparatuses (views, in the sense of MRC), the involved view V *acts also like a generator* G which just selects out of R an object-entity, namely the field of perceptibility of V , and – simultaneously – also qualifies this object-entity: we can symbolize by $G(V)$ such a *generator of a view* and by $(G(V), V)$ the corresponding epistemic referential. In this case the action of a generator of object-entity is still deeper hidden than in the preceding case. This highly degenerate and so widespread 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 generation of object-entity, which permitted to this author to become aware of their general and fundamental epistemological importance.

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

This is why the question of reference has raised insuperable problems: the basic object-entities are only *surreptitiously* drawn into the natural basic descriptions (the *degenerate* ones produced in a reflex way *via* the biological sensorial apparatuses), with the status of a present but non specified reference. The problem of identifying a *posteriori* of what this reference consists, starting from the already achieved description, has stubbornly resisted solution.

But accordingly to MRC, an operation of generation of object-entity is *always* involved, even if in a non separated and implicit or reflex way.

By construction, any relative description $D/G, \alpha_G, V/$ 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. 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 three notations G, α_G, V designate three descriptive **roles**, three descriptive functions, **not** the nature of the entities to which these roles are assigned in the case of this or that particular relative description.*

And all these three roles are systematically played in any relative description, even if an actor cumulates distinct roles, or plays a role superficially, or both. For instance, if I say «"red" is a too poor expression, better say "colour of blood"», the first proposition expresses verbally a relative description $D/G, \alpha_G, V/$ where "red", though grammatically it is an attribute, holds the role of the object-entity α_G (generated by use of a generator G which is a selector acting upon the spot R_G from R indicated by the word "colour"), 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. So the structure required by the definition D5.1 of an aspect-view, is only a necessary condition for acting *as a view*, but this condition does not hinder a view in the sense of D5.1 to act also in the *role* of an object-entity (like in the first above example) or in the role of a generator $G(V)$ of object-entity that generates its field of perceptibility by interaction with R .

According to MRC no operation or concept possesses intrinsically a fixed descriptive role.

In each descriptive act, the descriptive 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 the role of generator, and what that of view. A description $D/G, \alpha_G, V/$ is a piece of constructed normed 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 $D/G, \alpha_G, V/$, but it can include this structure in a more or less implicit, truncated,

malformed way. Whereas in the normed form $D/G, \alpha_G, V/$ all the three involved roles G, α_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, labelled rooms that have to be filled up in a reference-questionnaire to which any achieved or envisaged description must be subjected.

The distinction, inside a relative description $D/G, \alpha_G, V/$, between the relativity to the operation G of object-entity generation of which the role is to produce an object-entity, and the relativity to this object-entity α_G itself of which the role is to bear subsequent qualifying examinations, is one of the most subtle and important features of MRC. In particular it preserves from the very strong inertial tendency induced by classical thinking, to forget that as soon as an entity is regarded as playing in a description the role of object-entity, *ipso facto* a corresponding epistemic action of generation of object-entity has produced it *as such*, implicitly or explicitly, even if this entity somehow pre-existed and so has only had to be selected as object-entity, not to be radically created as such. The importance of a normed *memento* of this fact will fully appear in V.1 and V.2.

The association, in any relative description $D/G, \alpha_G, V/$, between a one-one relation $G-\alpha_G$ and the requirement for D of, indifferently, either a strong individual stability or an only probabilistic one, is intimately related with the impossibility, for mere language as well as for mere notations, to grasp and capture the factual individualities, neither in an absolute sense *nor* in only a relativized sense (cf. $\pi 12$, its "proof" and the comments). 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 transcendable evidence of individual existence»⁹. Indeed each predicate (view) is general, and no conjunction of a finite number of predicates can ever exhaust the open infinity of the possible qualifications of a physical object-entity.

In this context, let us note that *full*, non-verbalized factual singularity can be associated with the one-one relation posited between an operation of generation G and its result labelled α_G , in the following sense. According to this posited relation, $G' \neq G$ entails $\alpha_{G'} \neq \alpha_G$. Which can be translated in observational language as follows: if two object-entities are introduced by two different generators G and $G' \neq G$, then it exists at least one view V that yields different descriptions of α_G and $\alpha_{G'}$. This assumption is what founds the belief in "experts", for instance experts able to discern an original painting from a copy, no matter how perfect.

The concept of relative description is selective. It does not admit inside the class delimited by it, illusory descriptions where one of the three roles G, α_G, V is not played at all. Consider for instance the famous illusory description «this is a lie» (or «I am a lie») where the word "this" (or "I") masks the absence of specification of the operation G of generation of object-entity, so also *the absence of specification of the object-entity α_G itself*. This blocks any further conceptual development. Indeed, previously to any research of a truth-qualification of the description, one finds oneself in a situation of impossibility to decide concerning the mutual existence in the sense of D7 between the involved object-entity α_G – non specified – and the involved view V . If this primary non-decidability concerning the *a priori* possibility of meaning, were permitted to enter the concept of relative description, it would manifest itself later in the form, also, of a paralysis of any attempt at a metaqualification of the *relative proposition* founded on this illusory description *via* the values $g_k = \text{true}$ or $g_k = \text{false}$ of a meta-aspect-view $g = \text{empirical truth}$ (cf. DL.2 and DL.3 in V.1.2).

When descriptions that violate the MRC norms, are reconstructed in a normalized way, the paradoxes stemming from them disappear. There is no need for this to introduce levelled languages of logical types, the illness is cured *locally* by the normed reconstruction of only the considered description.

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 $D/G, \alpha_G, V/$ by no means constitutes an *a priori* pauperisation of the ensemble of descriptions that can be studied inside MRC.

Finally, the general concept of relative description, by its various realizations, permits to discern definite categories inside the realm of the problem of reference and of meaning, and a *dégradé* of proposed solutions: the definitions D14.1, D14.2.1 and D14.3.1 introduce, for the corresponding circumstances, what might stand as a solution or be completed to become one; the definition D14.2.2 suggests a possible approach concerning some of the circumstances to which it applies, while others are isolated as the most problematic; finally, the non achieved definition D14.3.2 concentrates in it definite questions and suggestions.

Like the one-one relation between a given generator of object-entity and the corresponding object-entity, like the definition of relative existence and then the frame-principle P8, the concept of relative description with the three roles involved by it, is an act of (qualitative) *formalization*, involving a methodological essence.

4.2.3. Cells of relative description. Chains of descriptonal cells. Non-reducible complexification of the conceptualization.

P15. The Principle of Separation. Since any one relative description $D/G, \alpha_G, V/$, 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 actor designated for holding one of the roles from the triad G, α_G, V , another description is considered.

⁹ Eco, U., *Kant et l'Ornithorynque*, Grasset 1999, p. 29. My translation from the French edition.

By a methodological principle called the *principle of separation* and denoted PS, this other description must be treated *separately*.

Comment. Any human observer-conceptor, in presence of reality, is condemned to parcelling examinations. The successivity inherent in human mind, the spatial confinements imposed by the bodily senses – whatever prolongation is 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, α_G, V . Indeed the relativity to one triad G, α_G, V specifies, but also limits the capacity of one given relative description to generate information possessed.

Relativization, limitation, and precision, are *tied* to one another in an unseparable way. *They constitute together an indivisible whole that withstands relativism.*

On the other hand any fragment generated out of reality in order to play the role of an object-entity, admits of an infinity of kinds of examinations. Moreover any examination achieved on this object-entity, raises the question of the appearance of its result *via* this or that view with respect to which this result exists in the sense of D7, or the question of the relations of this result, to other object-entities, etc., thus multiplying the conceivable subsequent object-entities and examinations. These confinements and these endless and changing vistas call forth haste and panics of the mind which 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 and different views; a tendency to work out simultaneously several different descriptions. But as soon as the elaboration of several different relative descriptions is simultaneously tried, the various involved generators of object-entity, 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 entered upon, 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 requires the conceptualization, by method, to be achieved by explicit separation in mutually distinct, successive, closed, cellular descriptonal steps.

In particular the principle of separation PS surveys the saturation of a description. It rings the bell as soon as the descriptonal capacities of a started description must be considered to have been exhausted, because all the qualifications *via* the view chosen for acting in that description, of the object-entity corresponding to the generator chosen for acting in that description, have been already realized by performing a big number of repetitions of all the successions $[G, V_g]$ available in that description. PS announces that once this has been done, the descriptonal 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 information inside this same epistemic referential, either is useless or it manifests the surreptitious intrusion of another generator of object-entity, or of another view, or both; that – to avoid stagnation, paradoxes or infinite regressions – one has to stop this intrusion or 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 by the sign "." or the word "stop" in the transmission or writing down of a message; or else, a role similar to that played in algebra by the closure of a previously opened parenthesis.

The principle of separation PS is a *formalizing* requirement of the nature of a rule of calculus.

Thereby any process of conceptualization that is normed accordingly to MRC, is clearly divided in a sequence of localized descriptonal cells, and thus it develops by 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, co-operate for the task of preventing sources of unintelligibility, and also of detecting and suppressing them.

The principle of separation possesses a remarkable capacity of organization of the conceptualization. This assertion will find many illustrations in the sequel of this work.

D16. Relative metadescription. The principle of separation requires descriptonal closures and new starts. These entail the necessity of an explicitly and fully relativized concept of metadescription prescribing how to transcend "legally" an already saturated description.

Consider a precedingly achieved relative description to which the *order* 1 is assigned conventionally: $D^{(1)}/G^{(1)}, \alpha^{(1)}, V^{(1)}$ (in short $D^{(1)}$); and instead of α_G we write α , to simplify the graphism). Consider a generator that selects $D^{(1)}$ as a new object-entity $\alpha^{(2)}$, denote it $G^{(2)}$ and call it a *metagenerator* (or a *generator of order 2*) *relative to* $D^{(1)}$. So we have $\alpha^{(2)} \equiv D^{(1)}$. Consider also a view involving *aspects of order 2* with respect to which $D^{(1)}$ does exist in the sense of

D7 (for instance the aspect of factual truth of $D^{(1)}$, or else some aspect of *relation* inside $D^{(1)}/G^{(1)}, \alpha^{(1)}_G, V^{(1)}/$, between the various gk-space-time qualifications produced by the examinations of $\alpha^{(1)}$ by the initial view $V^{(1)}$, etc.; call it a *metaview* (or a *view of second order*) relative to $D^{(1)}$ and denote it $V^{(2)}$. The description which is relative to the triad $G^{(2)}, \alpha^{(2)}, V^{(2)}$ will be called a *metadescription* (or a *description of order 2*) relative to $D^{(1)}$ and it will be denoted $D^{(2)}/G^{(2)}, \alpha^{(2)}, V^{(2)}/$ (in short $D^{(2)}/D^{(1)}$, or $D^{(2)}$).

The same denomination and notation are conserved if **(a)** $G^{(2)}$ selects as a new object-entity $\alpha^{(2)}$ not only $D^{(1)}$ considered globally, but furthermore it includes in $\alpha^{(2)}$ also separate elements from $D^{(1)}/G^{(1)}, \alpha^{(1)}_G, V^{(1)}/$ specified explicitly ($G^{(1)}$, or $\alpha^{(1)}_G$, or $V^{(1)}$, or two or all three of them) which permits then to introduce in $V^{(2)}$ aspects of relation between such an element, and the global result $D^{(1)}$ to which it has contributed. Or if **(b)** $G^{(2)}$ selects a whole *set* $\{D^{(1)}_1, D^{(1)}_2, \dots, D^{(1)}_m\}$ of previously achieved relative descriptions (with an explicit reconsideration, or not, of elements from these descriptions), in which case $D^{(2)}$ is relative to all these descriptions. In this way a very free and rich concept of normed relative metadescription is introduced ¹⁰.

Comment. The definition D.16 can also be applied to $D^{(2)}$ thus leading to a metadescription $D^{(3)}$ of order 3 relatively to $D^{(1)}$ and of order 2 relatively to $D^{(2)}$, etc. In this way it is possible for any consciousness-functioning CF to develop unlimited descriptonal chains $D^{(1)}, D^{(2)}, \dots, D^{(j)}, \dots, D^{(n-1)}, D^{(n)}$ of hierarchically connected relative descriptions of successive orders $j=1, 2, \dots, n$ – with an arbitrary origin denoted $D^{(1)}$ – in each one of which the involved metaview can contain all the desired pertinent new meta-aspects of order n .

So in general the order of a description is not an absolute, it labels the place where this description emerges inside the considered chain of conceptualization, while a chain can be started *conventionally* by these or those previously achieved descriptions to which the order 1 is assigned.

But a basic transferred description can only have the minimal conceivable order, no matter in which chain it is involved. Therefore this non-conventional minimal order will be denoted by 0, to distinguish it from any conventional initial order 1.

And any chain, if it has first been conventionally started with already previously achieved descriptions to which the order 1 has been assigned, can always be later completed downward until a basic transferred descriptions is identified which roots the chain into pure factuality. Thereby the chain hits an absolute end (or equivalently, it finds its absolute beginning), which entails a corresponding re-notation upwards of all the successive orders of the involved descriptonal cells. But a given relative description can belong to different chains that meet in it (it can be a node of the web of chains of conceptualization). So, regarded as a cell from distinct chains, a same description can have different orders.

But the feature of being a metadescription (or not), is an absolute if transferred descriptions constitute the origin used as reference, since the zero order of a transferred description is an absolute.

This amounts to the remark (rather obvious *a posteriori*) that:

The (open) set of all the possible relativized descriptions falls apart in just *two* (evolving) layers: **(a)** the layer of transferred descriptions of physical basic object-entities which, by definition, are not themselves previously achieved descriptions, and **(b)** the layer of metadescriptions in the absolute sense, i.e. of descriptions of object-entities consisting of previously achieved descriptions ¹¹. Both layers have an evolving content.

¹⁰ Here we can go back to the important distinction from the note 20 between "objectual" qualifications – call them "objectities" – and "state"-qualifications (note 20). The objectities are (relatively) stable qualifications that apply in an invariant way to a whole class of evolving states, thereby defining the "object", in the current sense, that assumes this or that state. So according to this language *the term object-entity labels only a descriptonal role in the sense of the general comment of D14, while "object" in the current sense means «endowed with some objectities»:* inside MRC these two words should not be confounded. For instance, the state-qualifications called position, momentum, energy, etc., can vary or evolve from one state to another one, thereby introducing an infinite class of states of a definite sort of "object" labelled, say, "electron", that is characterized by the *meta*qualifications consisting of the numerical values obtained (with some given system of unities) for objectities like mass, charge, spin, that are the same inside the whole class of what is called "states of electrons". These objectities however can themselves change by creation or annihilation of the corresponding object, and when the conditions for such changes are realized they can be regarded as states of some more general object (at the limit, of what is called field or energetic substance). In this way the language introduced here can organize conveniently various hierarchies of degrees of abstraction.

¹¹ However it is curious to note that there are various sorts of rooting of a basic object-entity, into pure factuality: the *objectual* manifestations of a basic object-entity, in the sense of the note 31 can be *conceived* (not known, just imagined) to be tied with pre-existing "own" features of this basic object-entity (cf. D19) which, though unknown, are always the *same*. In this sense, a basic object-entity which is *a priori* researched as located inside the genus labelled *micro-object* (i.e. is researched exclusively *via* objectual manifestations) is thereby *a priori* endowed with a rooting into pure factuality which is less hidden than that of a basic object-entity researched *a priori* as located inside the genus labelled *microstate*, because it is posited to reach the level of observability by just a time-invariant coding transposition, not by the coding of the effects of a (measurement) *evolution* produced by the processes of examination. These remarks amount to the assertion of various possible deliberately chosen *depths* of the rooting of a transferred description, into physical factuality.

Through the first layer, the prime matter for the elaboration of meaning is drawn into conceptualization, and inside the second layer the basic meaning produced in the first layer undergoes abstract transformations which progressively elaborate indefinitely complexified meanings.

It is essential to note that in any chain, for each passage from a descriptive 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 (evolving) descriptive curiosities-and-aims, such as these emerge at any given time from his own biological, temperamental, and social-cultural background: it is the consciousness-functioning CF who, step by step, chooses the "direction" of the descriptive trajectory drawn by the succession of the cellular but connected descriptive closures $D^{(n-1)}, D^{(n)}, D^{(n+1)}, \dots$ which, accordingly to [P15+D16], produce the indefinite progression of a hierarchical chain started by conventionally initial conceptual descriptions $D^{(1)}$ or by absolutely initial basic descriptions $D^{(0)}$.

So – as long as no method or algorithm is found for determining as a function of some definite parameters – a new epistemic referential each time that a passage from a description to a metadescription (with respect to it) takes place, a descriptive chain remains a concept that cannot be absorbed in the concept of computation. And even if such an algorithm were specified, furthermore also the determination of the parameters on which the new referential depends should emerge automatically: accordingly to what criteria? Etc. The subjective successive descriptive aims play a decisive role in the representation of the processes of conceptualization offered by MRC. But on the other hand, the representational structure assigned by MRC to the processes of conceptualization, namely the structure of a web of chains of increasingly complex relative descriptions, is a (qualitatively) formalized structure, involving definite methodological rules and conventions.

This brings clearly into evidence that "a formalized epistemology" in the sense of MRC is quite fundamentally distinct from a reduction to computation.

Once this established, let us furthermore examine below the question of reductions of another sort.

III7. Anti-reductionist proposition. Inside MRC the "reduction" of a metadescription of order n (D.16) to the descriptions and elements of descriptions of order $n-k$, $k=1, 2, \dots, n-1$ involved in it, is in general impossible.

"Proof". Consider the metaobject-entity $\alpha^{(n)}$ from a metadescription which, inside the considered chain, is of order n , $D^{(n)}/G^{(n)}, \alpha^{(n)}, V^{(n)}$. An isolated element from $\alpha^{(n)}$ (a description $D_j^{(n-1)}$ of order $n-1$, or some other descriptive element of order $n-1$ from such a description (generator, object-entity, view)) 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 metaview $V^{(2)}$ of order 2 from the metadescription $D^{(2)}/G^{(2)}, \alpha^{(2)}, V^{(2)}$ relatively to $D^{(1)}/G^{(1)}, \alpha^{(1)}, V^{(1)}$, can contain the aspect of *distance* between two space-gk-qualifications of order 1 involved by $D^{(1)}/G^{(1)}, \alpha^{(1)}, V^{(1)}$, with respect to which these qualifications *themselves* do not exist in the sense of D7. Or else, $\alpha^{(2)}$ can contain two previously achieved descriptions of physical object-entities, $D_A^{(1)}$ and $D_B^{(1)}$ involving both a same view $V^{(1)}$ (so qualifications of a same nature) while $V^{(2)}$ contains a meta-aspect of order 2 of *comparison* of these qualifications, whereas neither $D_A^{(1)}$ alone nor $D_B^{(1)}$ alone, nor descriptive elements from these, do exist in the sense of D7 with respect to this meta-aspect of comparison. In general terms now, the new qualifications of order n that can be involved in a metadescription $D^{(n)}$ while they cannot be involved in the descriptions of order $n-1$ contained in $D^{(n)}$, consist of *global* or *connective* metaqualifications of order n concerning two or more descriptive entities of order $n-1$ from the object-entity $\alpha^{(n)}$ from $D^{(n)}$ (consisting of whole descriptions of order $n-1$, or generators of object-entities, or object entities or views, of order $n-1$). These, when considered separately inside the descriptions of order $n-1$, *do not exist in the sense of D7 with respect to any of such new metaqualification of order n involved by $D^{(n)}$* .

So in general $D^{(n)}$ is not reducible to the descriptions or descriptive elements of orders $n-k$ from the same chain.

Comment. On each descriptive level of a given order n from a descriptive chain (D.16), the descriptive cell $D^{(n)}$ placed on this level introduces, *via* the condition of relative existence D7, the possibility of new qualifications, of which the very definability and meaningfulness are conditioned by the previous achievement of the descriptions from all the previous levels $n-1, n-2, \dots, n-n$:

Throughout the development of a process of conceptualization normed accordingly to MRC one can literally watch the creative complexifying work of cognitive time: *one can literally see what "emergence" means.*

It is remarkable that inside MRC this conclusion follows from the system of basic definitions, postulate and principles, in a way that permits a clear perception of the nature of each contribution to the conclusion. One can distinguish between contributions of a factual nature as for instance those brought in by a basic description $D^{(0)}$, and on the other hand contributions of psychological nature like the choices of epistemic referentials for the successive descriptive cells, or of methodological nature like the condition D7 of mutual existence and the principle of separation P15:

There is no need any more for pleading, arguments, etc., in order to draw attention upon the specific character, the mechanisms and the features of what is labelled by the words "complexity", "complexification", "emergence".

So, by normed complexification, the transferred descriptions that start from the inside of pure factuality and by which phenomena acquire a first communicable form, are then developed in unlimited chains of hierarchically connected metadescriptions of increasing order. These chains can meet and interact variously at various levels and thus they weave indefinitely complexifying and non predictable forms of communicable significance.

The consequences of the association between the principle of separation and the concept of relativized metadescription, are innumerable and always important. But in the absence of a normed descriptive structure to which any description be referable, they cannot be systematically identified and controlled.

4.2.4. Reference, and minimality of the MRC-realism

In this stage of the elaboration of MRC it is already possible to entirely elucidate *a posteriori* the *a priori* somewhat obscure features introduced by the definition D4 of a generator of object-entity (the posited one-one relation $G-\alpha_G$) and by the realist postulate P3 (cf. note 25). We shall now achieve this by a succession of three propositions. Thereby also the reflexive character of MRC will gain new illustrations, while the formalized character of MRC will become clearer.

$\pi 18$. Propositions on reference and minimal realism.

$\pi 18.1$. (On comparability, identity, and the relation $G-\alpha_G$). A basic object-entity is inexistent in the sense of D7 with respect to any "comparison-view": such a view is a metaview with respect to which only descriptions exist in the sense of D7, never basic object-entities.

"Proof". 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 with respect to which these descriptions do both exist in the sense of D7. One can for instance ask: are D_1 and D_2 identical or different with respect to this or that gk -value of the aspect-view V_g ? If V_g is absent in one or in both considered descriptions, the question is *meaningless* because D_1 and D_2 constitute together a meta-object-entity $(D_1, D_2)^{(2)}$ that does not exist in sense of D7 relatively to a metaview of g -comparison, say $V_{g_c}^{(2)}$, so *a fortiori* a gk -identity can be neither established nor refuted. If on the contrary both D_1 and D_2 do make use of V_g , then $(D_1, D_2)^{(2)}$ and $V_{g_c}^{(2)}$ do satisfy D7 and so one can research whether yes or not they do possess some gk -identities. In this example I have brought into play a most simple comparison-view, with respect to only one aspect g . Nevertheless this view is already, quite essentially, a *metaview*. One can form much richer metaviews of comparison. But all are metaviews relative to definite views with respect to which only previously achieved descriptions can exist in the sense of D7.

A basic object-entity – a bulk of pure a-conceptual factuality – is not a previously achieved description. Therefore it cannot be compared, neither to "itself" nor to something else.

Comment. So the whole stratum constituted by the very first products of the epistemic actions – the stratum of basic object-entities introduced by basic generators – is not reachable by the concept of comparison and by the qualifications derived from it, identity, difference, degree of similitude. For basic object-entities these qualifications cannot be established by investigation, they can only be posited by method (like in the definition D4 of a generator of object-entity). When a given basic operation $G^{(o)}$ of generation of object-entity is repeated, it simply is meaningless to ask whether yes or not the object-entities $\alpha^{(o)}$ produced by this operation are all identical: this finally *finds "deductively" inside MRC the impossibility to assign a general meaning to the question whether yes or not the repetition of a given operation G of generation of an object-entity α_G , produces identical results α_G* . So the posit of a one-one relation $G-\alpha_G$ appears *a posteriori* to be necessary indeed in order to be always able to speak and think fluently concerning the products of G ; while the significance of this posit, already specified to a certain degree in the comment on $\pi 12$, becomes now fully clear.

The one-one relation $G-\alpha_G$ founds a methodological strategy according to which the reference α_G – *defined from the start on* and posited to be unique – associates coherently with, both, the *a priori* condition of possibility in the sense of D7 of an as yet non-defined meaning of α_G with respect to a given view V , and with a subsequently constructed specified meaning of α_G with respect to V (while for another view $V' \neq V$, the relative existence D7, or a meaning of α_G , or both, might fail to exist).

Thus *the question of reference obtains a self-consistent and effective solution.*

$\pi 18.2$. "Local" proposition on the realist postulate. Consider a *physical* object-entity α_G . This is a fragment of physical reality generated by a given physical operation of generation G . The fact that any communicable knowledge is description, and the relativity of any basic description to a basic view, *entail* that the sequence of words "knowledge of how α_G is in itself" is void of significance.

"Proof". Consider a physical object-entity α_G . Any communicable knowledge concerning α_G amounts to some relative description $D/G, \alpha_G, V/$. Any relative description $D/G, \alpha_G, V/$ belongs to some net of descriptive chains that is rooted in pure factuality *via* a (finite) number of *basic* transferred descriptions $D^{(o)}/G^{(o)}, \alpha_G^{(o)}, V^{(o)}/$ the basic object-entity $\alpha_G^{(o)}$ from which somehow contributed to α_G , has hereditarily transmitted into α_G some of its own semantic substance. Now, in each one of these basic transferred descriptions, the transfer-view $V^{(o)}$ acting there yields for the involved basic object-entity $\alpha_G^{(o)}$ a very first access to observability. But the principle P10, the propositions $\pi 11, \pi 12, \pi 13$, and the definition D14.3.1 of a basic description, show that, and how, the basic transfer-view $V^{(o)}$, while it yields this first access, also *inserts a non removable opaque screen between the acting consciousness-functioning CF and $\langle\alpha_G^{(o)}\text{-in-itself}\rangle$* , it bars the way of human knowledge toward $\langle\alpha_G^{(o)}\text{-in-itself}\rangle$. So the unavoidable and non removable descriptive relativities explicated inside MRC, and the fact that any communicable knowledge is description, entail inside MRC that [knowledge-of-the-physical-reality-as-it-is-in-itself] is nothing more than a meaningless combination of words, devoid of any designatum.

Comment. Since Kant the impossibility to know how a physical entity "is-in-itself", is accepted as an obvious postulate inside philosophy. But many physicists still are reluctant to fully realize this definitive limit of human rational knowledge. So it seems worth mentioning explicitly that inside MRC this limit follows from the posited assumptions without being one of these. So that there is no need to assert it as a logically independent assumption. Then those who contest this limit should specify which posited assumption(s) they contest.

$\pi 18.3$. "Global" proposition on the realist postulate: minimality. 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*, apart from the interior reality from my own mind, of also a physical reality independent of any act of observation; but an existence which is strictly *non-qualifiable* "in-itself", beyond the mere trivial and non-informative, idempotent assertion of its relativized *qualifiability*, if acts of observation of it do take place in the conditions D4-D7 (in the absence of which P3 would be aimless).

"Proof". According to the definition D2, "the physical reality", globally considered, is just a *posited* substratum wherefrom all the *basic* object-entities $\alpha_G^{(o)}$ considered in $\pi 18.1$ and in the proof of $\pi 18.2$, are conceived to be extracted. Only this and nothing more. It would then be an arbitrary conceptual discontinuity, a leap, a kind of spontaneous generation, of *Deus ex Machina*, and even an inner inconsistency, to assign to this substratum posited by *us*, properties that transcend the very descriptive essence of *all* the fragments $\alpha_G^{(o)}$ that we extract from it, namely the impossibility shown by [$\pi 18.1+\pi 18.2$], to know any qualification whatever concerning a basic object-entity $\alpha_G^{(o)}$ in-itself.

Comment. 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 weak sense that marks all the "proofs" – of the non removable descriptive relativities. So much more so that the forces which withstand the distinction between mere existence of something, and *knowledge* of *how* this something *is*, are huge.

Final global comment on the realist postulate P3 (cf. note 25). By now, I think, the specificity of the concept of "physical reality" with respect to the general concept of reality introduced by D2, has come out with satisfactory definiteness, mainly *via* the frame principle P8, the principle P10 of individual mutual exclusion, the propositions $\pi 11, \pi 12, \pi 13$, the concept D14.3.1 of basic transferred description, and the propositions from this point 18. Thereby, retroactively, the necessity of the postulate P3 as well as its significance should have become clear. This necessity lies in the fact that *the formulations mentioned above would not have been possible without P3*. As for the significance of P3 inside MRC, it can be best grasped *per a contrario*: it is that which inside MRC makes no sense, or no clear sense, when one considers elements of reality consisting of *concepts*, social facts, etc.

As for the minimality of the realism asserted here, I suppose that notwithstanding the proposition $\pi 18.3$ many will tend to continue to nurture in their minds a non-minimal realism. But reconsider in full light the quasi irrepressible hope that, in spite of all, some model or "only some invariants", might some day transpire the obstacle generated by the descriptive relativities and inform us definitively, even if only in a coded way, on *how* the physical reality is-in-itself, independently of any perception. And on the other hand, consider the necessarily fragmenting character of the knowledge that human mind can construct, the indefinite and evolving multiplicity of the possible basic object-entities $\alpha^{(o)}$ as well as of the basic transfer-views $V^{(o)}$ which – now or in the future – could be found to exist in the sense of D7 with respect to a given basic object-entity $\alpha^{(o)}$: these stress even more, if this is still possible, the illusory character of such a hope for non-minimality. Indeed, given the non removable dependence of thought on perception, given the non removable dependence of perception on fragmenting descriptive relativities, given the unpredictable and incessant complexifications brought forth by the so various, and unbounded, hierarchical chains of metadescriptions that are growing everywhere, given the unpredictable changes of "viewpoint" (of epistemic referential) which these complexifications might bring forth – certainly radical from time to time – on *what* a rational basis could one uphold the postulation of some convergence toward a definite, definitive, terminal, absolute descriptive structure (supposing that this succession of words were endowed with some meaning) ? What a sort of invariants, magically stabilized against all

the changes brought forth by the growth of thought, and magically freed of any descriptive relativity, could, thus stripped, nevertheless carry *knowledge* of the way of being of physical reality in-itself, beyond the posit of its mere existence? When knowledge is nothing else than qualifications *via* some view, of a somehow delimited object-entity, so qualifications relative to some view and some generator of object-entity? Obviously one ends here up in a whirl of circularity.

4.2.5. Relative models versus minimal realism

But if any knowledge-of-how-physical-reality-is-in-itself, is indeed an illusory self-contradicting concept, *why do our minds so stubbornly keep to this concept?* This is a question which deserves being examined.

So I close now this exposition of the nucleus of MRC as follows. First I shall show why the illusory belief in the possibility to reach knowledge of how physical object-entities are in-themselves, is quasi irrepressibly generated by human mind, in consequence of the frame-principle P8. And then I shall show how, once identified, the fallacy vanishes and leaves place to dimensions of conceptual liberty.

I proceed by defining a last group of four concepts which specify entirely the philosophical status of the minimal realism asserted here.

On the insufficiency of the basic transferred descriptions. Consider first an *individual* transferred description $D^{(o)}/G^{(o)},\alpha^{(o)},V^{(o)}$ of a physical basic object-entity $\alpha^{(o)}$ (i.e. for any aspect-view $V_g^{(o)} \in V^{(o)}$, when the succession $[G^{(o)},V_g^{(o)}]$ is repeated, always the *same* value gk is obtained). In this case, by hypothesis, the epistemic referential $(G^{(o)},V^{(o)})$ insures for the transferred results the *strongest* possible sort of qualificational stability ($\pi 12, \pi 13, D14.1$). While furthermore, according to D14.3.1 the basic transferred description $D^{(o)}$ characterizes observationally the involved basic object-entity $\alpha^{(o)}$. So one finds oneself already in possession of an observational invariant that associates a quite definite *meaning* to what has been labelled *a priori* " $\alpha^{(o)}$ " (cf. the comments on the final posit from D14.1.3). It might then be argued that this "suffices", that in such conditions there is no reason for researching further specifications concerning what has been labelled $\alpha^{(o)}$. But the fact is that in general such a "sufficiency" simply is not experienced by the observer-conceptors: in presence of even an *individual* transferred description $D^{(o)}$ that produces a most immediately manifest observational stability, 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 has labelled $\alpha^{(o)}$. But a "better, clearer meaning of $\alpha^{(o)}$ ", in what a sense, exactly?

When one tries to answer this question it appears that what is researched is a representation of $\alpha^{(o)}$ 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.

Furthermore a global and explicit space-time representation is (vaguely) desired for also the processes that have led from the basic object-entity $\alpha^{(o)}$ with its own space-time location, to its basic transferred description. *The frame-principle P8 is here at work.*

The requirements of the frame-principle cannot be violated definitively. One can at most postpone dealing explicitly with them. The frame-principle expresses a psychological fact which is as irrepressible as the physical fact that masses are tied with gravitation. If a basic transferred description of a basic object-entity is asserted, then one should be able to imagine some possible own form of space-time-gk-values of this object-entity, as well as some possible own structure of space-time-gk-values of the process that has generated the description. If not, the frame principle will keep active and upset us.

A basic transferred description $D^{(o)}$, though, yields no hint for satisfying these requirements. It is expressed *exclusively* in terms of observable features of *registering devices* which are all *distinct* from what is labelled $\alpha^{(o)}$. It yields no representation whatever concerning the space-time location of the basic object-entity $\alpha^{(o)}$ itself. Inside a basic description $D^{(o)}$ the involved basic object-entity $\alpha^{(o)}$ is not represented as an autonomous individuality endowed with an own form, it still floats behind as a mere labelled nebula suggested by the words "basic object-entity" and their notation $\alpha^{(o)}$. And even if, for a moment, we suspend any question concerning specifically $\alpha^{(o)}$, and we consider $D^{(o)}$ as a whole, again we find ourselves in presence of an absence of space-time intelligibility. Indeed, given that each registered mark gk involved by $D^{(o)}$ is found on a g -apparatus and that the transfer-view $V^{(o)}$ must involve at least two different g -apparatuses for measuring two mutually incompatible basic aspect-views, the "form" of space-time-gk-values involved by the basic transferred description $D^{(o)}$ itself is found to cover a scattered domain of space, tied with different registering devices *that can lie arbitrarily far from one another*. And given that the time-origin t_o has to be re-established after each realization of a succession $[G^{(o)},V_g^{(o)}]$, it is not even clear whether it is possible to somehow associate this form with some continuous evolution (or persistence) ordered by a unique increasing time-parameter.

In short, by $D^{(0)}$ alone one cannot "understand" intuitively, neither how the basic object-entity can be conceived to "be", nor in what a sense, exactly, $D^{(0)}$ is a "description" of this basic object-entity. This situation is tiring for the mind. Therefore an individual basic transferred description $D^{(0)}$ is not perceived as an *achieved* descriptional action. It is not felt to have reached a conceptual stage of epistemological equilibrium. It is obscurely felt as if loosely fixed on a steep conceptual slope where a conceptual force draws it toward a separated representation of $\alpha^{(0)}$ in terms of own *gk-space-time* aspect-values.

This sort of need might be regarded as a methodological instinct tied with the frame-principle, induced by the adaptive biological evolution of our minds.

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

So one is led to consider the following question: is it possible to elaborate, out of a previously achieved basic transferred description $D^{(0)}$, a separated description of the basic object-entity $\alpha^{(0)}$ involved in $D^{(0)}$? Not a description of «how $\alpha^{(0)}$ really is» – by now such naïve epistemic quests can be supposed to have been entirely transcended inside MRC –, but a specification of just a possible modus of *thinking* of $\alpha^{(0)}$ in a self-consistent, transparent, intellectually operational way that be naturally insertable into the current language-and-conceptualization. The answer to this question is positive and it is brought forth by the following three new definitions.

D19. Intrinsic metaconceptualization. Intrinsic model.

D19.1. Intrinsic metaconceptualization of a basic transferred description. Consider a basic transferred description $D^{(0)}$ of a physical object-entity $\alpha^{(0)}$, individual or probabilistic.

- Let $G^{(1)}$ be a metagenerator of object-entity consisting of a conceptual selector (D4) that selects for examination the meta-object-entity consisting of $\alpha^{(1)} \equiv [D^{(0)} + \alpha^{(0)}]$.

- Let $V_I^{(1)}$ indicate an *intrinsicizing metaview* (I: *intrinsicizing*) which, starting from the initial, purely observational, transferred description $D^{(0)}$, works out *intrinsic* qualifications of the basic object-entity $\alpha^{(0)}$ involved in $D^{(0)}$ (intrinsic: word used in order to distinguish from the philosophical term "in itself"). This, inside the new epistemic referential $(G^{(1)}, V_I^{(1)})$, is achieved as follows.

* Let $V_{Ig}^{(1)}$ (I fixed, $g=1,2,\dots,m$, Ig functioning as *one* compact index) be a set of m intrinsicizing meta-*aspect*-views which, together, constitute the intrinsicizing metaview $V_I^{(1)}$.

* Each intrinsicizing meta-*aspect*-view $V_{Ig}^{(1)}$ involves an *abstract*, conceptual $V_{Ig}^{(1)}$ -operation of examination of the *metaobject-entity* $[D^{(0)} + \alpha^{(0)}]$, namely an examination constructed in a way such that its possible results – necessarily values $(Ig)k$ of $V_{Ig}^{(1)}$, accordingly to the definition D.5.1 – are all *conceivable* as separate intrinsic qualifications $(Ig)k$ of the basic object-entity $\alpha^{(0)}$ that are compatible with $D^{(0)}$.

* The values $(Ig)k$ of the intrinsicizing metaview $V_I^{(1)}$ are furthermore constructed as: (a) intrinsic qualifications of $\alpha^{(0)}$ at the time t_0 which is the time-origin re-established at the beginning of each succession $[G.V_g]$ having contributed to the elaboration of $D^{(0)}$; (b) qualifications located inside a connected space-volume ∂r which $\alpha^{(0)}$ is posited to occupy at the time t_0 .

The relative metadescription $D^{(1)}/G^{(1)}, \alpha^{(1)}, V_I^{(1)}$ constructed as specified above will be called an *intrinsic metaconceptualization of the basic (individual or probabilistic) transferred description* $D^{(0)}/G^{(0)}, \alpha^{(0)}, V^{(0)}$ and it will be also assigned the alternative more specific symbol $D_I^{(1)}/[D^{(0)}, V_I^{(1)}]$.

Comment. We speak of "an" (not "the") intrinsic metaconceptualization of $D^{(0)}$, because in general many different intrinsicizing metaviews can be constructed, and each one of these yields a corresponding and possibly specific intrinsic metaconceptualization.

An intrinsic metaconceptualization of a basic transferred description $D^{(0)}$ realizes a *retro-active* localizing projection of the scattered form of $D^{(0)}$, onto a connected and instantaneous space-time domain $[\partial r, t_0]$. The uniqueness of the temporal qualification t_0 , even though it is retro-active, suffices now for permitting to posit, starting from it, an

intrinsic time-order that is hidden to observation. This permits now to assign a law of intrinsic evolution to what has been labelled $\alpha^{(o)}$, underlying any evolution of the observable transferred description $D^{(o)}$. As for the transferred description $D^{(o)}$, it can now finally be *explained*. The basic object-entity $\alpha^{(o)}$ can now be conceived to have "possessed" at the time t_o – on the connected spatial domain ∂r – the features assigned to it by the intrinsic metaconceptualization $D_I^{(1)}/[D^{(o)}, V_I^{(1)}]$. These, one can now think, were *own* features of $\alpha^{(o)}$, separated from those of any measurement device, independent of them, but features which $D^{(o)}$ has been able to transpose into observable manifestations, only by disorganizing the form of intrinsic gk-space-time aspect-values constituted by them. The scattered form of space-time-gk-values involved by $D^{(o)}$ can now be thought of as the result of a bursting and change of the initially integrated intrinsic features of $\alpha^{(o)}$ itself. A bursting produced by the mutual incompatibility of certain aspect-views $V_g^{(o)}$ from the transfer-view $V^{(o)}$ which has obliged us to perform a set of *different* successions $[G^{(o)}, V_g^{(o)}], V_g^{(o)} \in V^{(o)}$ in order to obtain the global transferred description $D^{(o)}$ (according to D19.1 at least two such incompatible aspect-views $V_g^{(o)}$ are necessary in order to characterize $\alpha^{(o)}$).

In short, by the assumptions from D.19.1 the basic object-entity $\alpha^{(o)}$ has acquired the specification of an *own* form of gk-space-time aspect-values, and the process of emergence of the basic, transferred description $D^{(o)}$ has been *causaled*: the categories of space, time and form have been restored for $D^{(o)}$ and $\alpha^{(o)}$, so $D^{(o)}$ has now become *intelligible*.

D19.2. Intrinsic model of a physical basic object-entity. So the intrinsic metaconceptualization $D_I^{(1)}/[D^{(o)}, V_I^{(1)}]$ constructs "explanatory" *relations* between its global meta-object-entity $\alpha^{(1)} \equiv [D^{(o)} + \alpha^{(o)}]$ and the basic object-entity $\alpha^{(o)}$ involved by $D^{(o)}$, as well as an own space-time representation of this basic object-entity $\alpha^{(o)}$. Once this construction has been achieved it is possible to extract from it exclusively the representation of the basic object-entity $\alpha^{(o)}$, in the following way.

The set of intrinsic qualifications of the basic object-entity $\alpha^{(o)}$ produced by the intrinsic metaconceptualization $D_I^{(1)}/[D^{(o)}, V_I^{(1)}]$, when considered *alone*, severed from all the other elements with which it is tied inside the intrinsizing metadescription $[D_I^{(1)}/D^{(o)}, V_I^{(1)}]$, will be called an (intrinsic) *model of $\alpha^{(o)}$* and will be symbolized by $M(\alpha^{(o)})/[V^{(o)}, V_I^{(1)}]$ in order to remind explicitly of the non-removable relativity of this model to the pair of views $[V^{(o)}, V_I^{(1)}]$ which determined its genesis and its characters.

Comment. It is important to realize clearly that an intrinsic model $M(\alpha^{(o)})/[V^{(o)}, V_I^{(1)}]$ is *not* a relative description *of $\alpha^{(o)}$* in the sense of the definitions D14.

The intrinsizing meta-aspect-views from $V_I^{(1)}$ that produced the qualifications assigned to $\alpha^{(o)}$ by the intrinsic model $M(\alpha^{(o)})/[V^{(o)}, V_I^{(1)}]$, have examined *the meta-object-entity $\alpha^{(1)} \equiv [D^{(o)} + \alpha^{(o)}]$, not the basic object-entity $\alpha^{(o)}$* .

The model $M(\alpha^{(o)})/[V^{(o)}, V_I^{(1)}]$ occupies finally a position of full epistemological saturation and equilibrium of the meaning assigned to what had been initially labelled $\alpha^{(o)}$. Its genetic compatibility with the transferred description $D^{(o)}$, as represented by the intrinsizing metaconceptualization $[D_I^{(1)}/D^{(o)}, V_I^{(1)}]$, detached it from $D^{(o)}$ like a mature fruit that has been plucked from its tree. The model $M(\alpha^{(o)})/[V^{(o)}, V_I^{(1)}]$ superposes now to the initial purely observational basic description $D^{(o)}$, a pragmatic, economic and stable conceptual *closure*. Namely a closure consisting of *an invariant with respect to the group of transformations from one succession $[G^{(o)}, V_g^{(o)}], V_g^{(o)} \in V^{(o)}$ that contributed to the elaboration of $D^{(o)}$, to any other such succession with a different aspect-view in it, $G^{(o)}$ being fixed*: the observable effects of all these different successions $[G^{(o)}, V_g^{(o)}], V_g^{(o)} \in V^{(o)}$, are now all assigned one common and definite "causal" ancestor $M(\alpha^{(o)})/[V^{(o)}, V_I^{(1)}]$ which produces various perceptible manifestations, in a "normal" way i.e. in a way that is understandable accordingly to the frame-principle P8.

When the basic transferred description $D^{(o)}$ on which the model $M(\alpha^{(o)})/[V^{(o)}, V_I^{(1)}]$ is founded involves exclusively the human biological sensorial apparatuses, this sort of closure emerges in an unconscious, non-mediated, genetically wired way: it *is* precisely what we believe to perceive, and *this* we automatically assign to, exclusively, the involved object-entity...*in-itself*. The stage of a transferred description $D^{(o)}$ remains unknown. And even when fabricated

apparatuses are connected to the biological ones, if the whole apparatus thus obtained still offers a directly intelligible form of space-time-gk-values, this form, again, is irrepressibly felt to reveal how the perceived object-entity is *in-itself* (think of perceptions via a microscope or a telescope) More: when, like in quantum mechanics, the observable basic transferred data do not themselves offer a directly intelligible form of space-time-gk-values, so if an intrinsic model $M(\alpha^{(o)})/[V^{(o)},V_I^{(1)}]$ has to be explicitly constructed from these data treated as mere coding signs, still, once a model has been constructed, it is usually felt to be satisfactory and *necessary* to such a degree that its only *hypothetical, retro-active, and relative* character tends to be skipped. Implicitly and fallaciously the intrinsic models $M(\alpha^{(o)})/[V^{(o)},V_I^{(1)}]$ conquer inside our minds a primary and absolute status.

This is the fallacy that instates the irrepressible belief that physical object-entities can be *known* "such as they are in themselves".

The unavoidable dependence of any intrinsic model of $\alpha^{(o)}$, on *both* an initial transferred description $D^{(o)}$ that has had to be achieved first and has involved some particular transfer-view $V^{(o)}$, and a subsequent process of intrinsic metaconceptualization $D_I^{(1)}$ involving a particular intrinsizing metaview $V_I^{(1)}$, tends to be overlooked. In particular, it tends to remain unnoticed that *another pair* $(V^{(o)},V_I^{(1)})$ would have led to a **different** model of $\alpha^{(o)}$.

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 opaque fictitious platform that floats above the physical factuality and on which is erected the classical concept of objectivity. The roots which insert the conceptualizations into physical factuality, with the relativities involved by them, are hidden beneath this fictitious platform.

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 primary, certain and absolute way, without reference to the initial transferred data on which it is founded and forgetting that it is just an economic, hypothetical, retro-actively imagined *construct*. While the initial transferred data, even though they are the sole certainties, because of their dispersed unintelligible phenomenal appearance, are implicitly and irrepressibly perceived as nothing more than "subjective" tools for finding access to the "objective truth": a *fallacious, illusive inversion*. We systematically commit what Firth¹² called «the fallacy of conceptual retrojection». Simplicity, invariance, and what we tend to call "truth" and "objectivity", have coalesced in a knot imprinted upon our minds by ancestral processes which, by implicit pragmatic causalizations, optimizes the efficiency of our behaviour, but blocks and botches the reflexive knowledge of our fundamental epistemological functioning. The interpretation as ontological assignments, of the results of our instinctive human adaptive constructs involving the frame-principle, is one of the worst and most stubborn pathologies of thought.

But in quantum mechanics this process has hit an obstacle. Up to this very day a type of intrinsic model $M(\alpha^{(o)})/[V^{(o)},V_I^{(1)}]$ fitting satisfactorily the quantum mechanical transferred descriptions of what is called a microstate, has not yet been found. So it has been necessary to stop the attention upon these transferred descriptions themselves such as they have emerged, and to embody these transferred descriptions in mathematical expressions able to yield, if not understanding, at least numerical predictions. And then, like a tireless insect when its instinctive constructive actions are hindered, human mind came back again and again upon these quantum mechanical transferred descriptions that resist modelling. And so it has become possible to discern more and more explicitly their specificity, which inside MRC has been redefined in quite general terms and has been called a "basic transferred" character. In this way we finally become aware of the unavoidable necessity of a quite universal first phase of conceptualization in terms of basic transferred descriptions.

Inside MRC the distinction between illusory ontological assertions concerning an absolute way in which $\alpha^{(o)}$ «really-is-in-itself», and relative methodological intrinsic models of $\alpha^{(o)}$, is quite radical, elaborate and clear cut. And the genetic order of the descriptive steps is re-constructed correctly and is fully displayed.

In these conditions the irreplaceable pragmatic and heuristic power of intrinsic models can be put to work without triggering any more insoluble philosophical pseudo-problems. Correlatively, the vain and exhausting battle between positivists and defenders of modelling, evaporates. The transferred descriptions are the unavoidable first stage of our processes of conceptualization, while the intrinsic metaconceptualizations of the initial transferred descriptions and the relative models extracted from these are a stabilising subsequent stage which, if realized, brings us down onto a (local and provisional) minimum of our potential of conceptualization.

¹² Firth, R., Reply to Sellars, (1981) *Monist* vol.64 pp. 91-101 (the quotation is from p.100).

There is no choice to be made. There is just an unavoidable *order of elaboration* to be observed, in a normed way, or to be recognized when it occurs implicitly.

D19.3. Minimal intrinsic metaconceptualization. Minimal intrinsic model. Consider a basic transferred description $D^{(o)}$ of a physical basic object-entity. The effect labelled $\alpha^{(o)}$ of the basic operation $G^{(o)}$ of generation of an object-entity can *always* be trivially metaconstructed accordingly to D19.1 so as to be conceivable as:

A bulk of potentialities of future observable manifestations, determined by $G^{(o)}$ on a finite space-domain ∂^3r , at the time t_o when $G^{(o)}$ comes to an end, each one of these potentialities being relative to an aspect-view $V_g^{(o)}$ from the basic view $V^{(o)}$ operating in $D^{(o)}$.

For this it suffices to posit in D19.1 the *minimal intrinsizing view corresponding to $V^{(o)}$* – let us denote it $[\min.V_I^{(1)}/V^{(o)}]$ – 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 $[\min.V_{I_g}^{(1)}]$ possessing a unique *minimal meta-aspect-value* denoted $I_{g_{\min}}$ that consists of the intrinsic *potentiality*, assigned to what has been labelled $\alpha^{(o)}$, to produce at a time $t_g > t_o$, any one among the transferred observable aspect-values gk of the basic aspect-view $V_g^{(o)}$, iff $\alpha^{(o)}$ is subjected at t_o to an $V_g^{(o)}$ -examination ($t_g - t_o$: the duration of a $V_g^{(o)}$ -examination, characteristic of the considered aspect g) (I recall that "intrinsic" means here assigned to $\alpha^{(o)}$ itself as an own feature, the word having been chosen in order to distinguish from the meaning of the philosophical term "in itself").

The trivial realization of the definition D19.1 specified above will be called *the minimal intrinsic metaconceptualization of the basic transferred description $D^{(o)}/G^{(o)}, \alpha^{(o)}, V^{(o)}$* and it will be denoted $[\min.D_I^{(1)}/D^{(o)}]$ (the relativity to the acting intrinsizing view $V_I^{(1)}$ is now included in the definition of the minimal intrinsizing view $[\min.V_I^{(1)}/V^{(o)}]$). The intrinsic model of $\alpha^{(o)}$ extracted from $[\min.D_I^{(1)}/D^{(o)}]$ will be called *the minimal intrinsic model of $\alpha^{(o)}$* and will be denoted $[\min.M(\alpha^{(o)}/V^{(o)})]$.

Comment. The following consequence of the final posit from D14.3.1 is quite worth being noticed. Any basic view $V^{(o)}$ that involves two mutually incompatible basic aspect-views $V_{g_1}^{(o)}$ and $V_{g_2}^{(o)} \neq V_{g_1}^{(o)}$ entails a minimal intrinsic model $[\min.M(\alpha^{(o)}/V^{(o)})]$ which now characterizes $\alpha^{(o)}$ *conceptually* (by predication). It yields a conceptual definition of $\alpha^{(o)}$ that can now be added to the purely factual definition of $\alpha^{(o)}$ insured initially by the operation $G^{(o)}$ alone (whereby $\alpha^{(o)}$ still remained outside knowledge) and to the subsequent purely observational description of $\alpha^{(o)}$ offered by the basic description $D^{(o)}$ (whereby $\alpha^{(o)}$, though characterized observationally, nevertheless was still devoid of an own conceptual representation). MRC brings forth *degrees* of characterization of a basic object-entity $\alpha^{(o)}$, which compose the complexifying sequence [purely factual \rightarrow purely observational \rightarrow conceptual]. From that stage on, chains of *non* minimal intrinsic metaconceptualizations can indefinitely increase the degree of conceptual characterization of $\alpha^{(o)}$. This illustrates the reflexivity of the method and its unlimited character.

As any intrinsic metaconceptualization and any intrinsic model, the trivial minimal models 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. This however does not in the least diminish the pragmatic importance of the fact that a minimal model of what is labelled $\alpha^{(o)}$ is a representation that permits a most natural, easy insertion of $\alpha^{(o)}$ into the conceptualization. Moreover it is always and automatically realizable. It is however useful to remember again and again that inside MRC this sort of representation is accepted as just an unavoidable strategic step that must be carefully distinguished from an ontological credo: nothing whatever is naïvely asserted concerning the impossible question of how the basic object-entity $\alpha^{(o)}$ «really-is-in-itself». It is only stated how this object-entity can be most simply conceived in order for us to become able to speak and think of it in structured, consistent, fluent terms.

4.2.6. Final comment on the realism involved in MRC

«...Thus the aim of the book is to draw a limit to thought – not to thought, but to the expression of thoughts: for in order to be able to draw a limit to thought, we should have to find both sides of the limit thinkable (i.e. we should have to be able to think what cannot be thought)»

Ludwig Wittgenstein, in the Preface to the *Tractatus*

The concept of *minimal* realism possesses, I think, an essential philosophical importance. Imagine an abstract surface on which are displayed all the grammatically correct structures of words that human mind can compose about the physical reality. On this surface, the concept of minimal realism is delimited by a boundary which coincides strictly with

the boundary that separates the domain of communicable *knowledges*, from the domain inside which can be found only expressions which are grammatically correct but are *devoid of reference*: this boundary defines the extreme limit which expressions of communicable knowledge can reach. The communicable knowledges cannot transcend this frontier. They can just advance toward it and eventually hit it by this or that basic transferred description which acts like a small squad carrying a local net of pre-conceptualization inside which it captures a small load of as yet unknown physical factuality which it hoists up on the very first level of speakable, communicable knowledge. But thereby the progression of the squad from inside the zone of knowledge, toward the physical reality, is stopped. The squad is reflected *back* like an elastic ball toward the inside of the realm of relative *descriptions*, where it delivers its load which, from that moment on, can indefinitely be elaborated along innumerable branches of complexification by intrinsic metaconceptualizations and/or by extraction of corresponding intrinsic models. But each one of these complexifying elaborations introduces new descriptorial relativities which *thicken* the screen between physical reality in-itself and our mind's representations of it, they thicken this screen so as to *improve intelligibility* and thereby the capacity to think and to act. Such is the paradoxical relation between physical reality and mind.

It is crucial to become aware, intensely, of the surreptitious advent of this *inversion* in our direction of conceptualization, of these unavoidable rebounds in the opposite direction each time that the extreme frontier of the domain of communicable knowledge is hit by a basic description. If not, we remain imprisoned in the inertial illusion that by modeling more and more we *approach* more and more the knowledge of how the physical reality "is-in-itself". The grammatically correct associations of words which express this illusion are founded upon a self-contradicting concept of reality-in-itself, namely the concept of a *qualifiable* reality-in-itself. Whereas reality-in-itself – by definition – is precisely what cannot be qualified more than by its mere qualifi-ability. By these words, "in-itself", what is pointed toward deliberately is *nothing* more than a posited existence, *posited* also to be qualifi-able but to be devoid of any other more specifying qualific-ation. Any further qualification, even the most feeble one, the most vague, is either idempotent, or generates contradiction.

This is not a matter of fact, it is a matter of organization of language-and-concepts.

The words "description" and "physical reality in itself" *had* to be somehow endowed with a definition (even if only implicitly). And, inside the system of language, this definition happens to be such that what is called description has been opposed (implicitly) *by construction* to what is called "physical reality in itself".

One might perhaps believe, for instance, that it is possible to gain one more inch by specifying that the reality-in-itself is "such" that the qualifications which it admits from our part are precisely those which are elaborated by our senses and our investigations. But when we focus attention on this supposedly supplementary specification, trying to capture an element of positive novelty added by it to the minimal realist postulate, we find only nothingness. We find ourselves placed on exactly the same content of information as before. Any attempt to superpose some nuance expressible in terms of approximations or of asymptotic apprehension of *how* the physical reality is in itself, would only manifest a misunderstanding of the nature of what is here involved, namely an optimized organization of concepts-and-words. One can reasonably try to fight against a physical circumstance, even if it is a "physical law", trying to master it in order to realize some technical aim. But trying to fight against the limitations entailed by a conceptual-linguistic organization, manifests a confusion concerning essence: what meaning would that have, for instance, to fight against the limitations imposed by, say, arithmetic, which one does not criticize and inside which one has placed oneself in order to work accordingly to its rules? "The-way-of-existing-of-reality-in-itself" is a self-contradicting notion stemming from a confusion between empirical circumstances and conceptual organizations of which on the other hand one makes current use.

In his Conference on Ethics Wittgenstein said (concerning the more or less similar confusion between value and truth): « it is perfectly, absolutely hopeless to thus bump our forehead against the walls of our cage » (my own retro-translation in English, from the French translation). One can apply the same assertion to the confusion between an impossible ontological quest, and an organization of language-and-concepts constructed by man. This confusion entails chimerical aims and fictitious problems. Or, like in the quantum mechanical orthodoxy, an arbitrary positivistic interdiction of intrinsic metaconceptualizations and intrinsic models *because these are confounded with impossible qualifications of reality-in-itself*. This mythic fauna that spouts from the bursting of an inertially oriented impetus to understand more, against the barrier placed by thought between all that is speakable, and a posited and denominated rest, must be exorcised.

So the minimal realism involved by MRC has a composite logical status. While the feature of minimality follows "deductively" inside the method ($\pi 18$), the main term, realism itself, is just a posit, the postulate P3. It is a declaration of metaphysical belief, wholly subjective. Any question of truth or objectivity is meaningless concerning it. But this metaphysical belief plays a fundamental role for MRC: it seats the method on a unifying ground. It asserts that beneath the endless proliferation of branching relativities which mark the contents of descriptions, there exists a substratum of non referred absolute, wherefrom the relativities emerge together with the conceptualizations. I say "beneath" in order to stress that the thesis of realism draws *out* of the domain of language and descriptions. By the mysterious powers of self-transcendence of language, this thesis acts like a verbal directional indicator, pointed from inside the volume of the expressible, but which points toward an existence from outside this volume. It grasps the attention, displaces it, and installs it at the very core of the non expressible. There, inside this background of unconceptualisable which it succeeds to designate, the realist thesis fixes the ends of the threads with the help of which the basic transferred descriptions *web to one another* – operationally, beyond words – the two regions that stretch out on the two sides of the ghostly but insuperable wall between what is by construction devoid of communicable expression, and the formulated and communicable. In spite of the fact that we cannot « find both sides of the limit thinkable ». This is the fundamental, the huge epistemological innovation hidden inside the quantum mechanical formalism, which inside MRC is explicated,

generalized, and organized in detail. Whereby *all* the false absolutes are suppressed, not only those which vitiate esthetics, ethics and metaphysics; for *everywhere* thought is invested by hosts of false absolutes that generate pathological tissues of illusory problems and paradoxes that blur out the sound limit between the thinkable, and mere non sense.

It might seem that this background of non referred, because it is absolute, is incompatible with the method of relativized conceptualization. But, and it is important to stress this, MRC by no means banishes *any* absolute. It banishes exclusively the false absolutes, those which hide descriptive relativities of which the presence can be identified, and which, if ignored, can generate illusory problems. But it is clear that when one constructs, it is unavoidable to posit certain absolutes. All the definitions from MRC, principles, etc., as *such*, have nothing relative about them. They are absolutes of the method, by the help of which the descriptive relativities are defined. And the existence of a physical reality posited in P3 is one of the legal absolutes of the method. This severely restricted concept is introduced as the final, absolute reference without which thought would get lost in an unexplained profusion of diversity; an absolute reference which unifies in one coherent whole all the indefinitely evolving descriptive relativities defined by the method.

I confess that the beauty which, to my eyes, emanates from this unification, appears to me irrepressibly as a sign of pertinence. Man and "reality" form a whole, and the feeling of beauty that can emerge in a human mind, intimately tied with coherence, has for me the significance of an announcement that certain slopes of the real have been embodied without having been violated. Whatever the unimaginable designatum of the succession of words which I just aligned, I want to align them, for we must somehow speak in order to communicate, in spite of all, concerning the unspeakable.

4.2.7. Global remarks on the nucleus of MRC

MRC is:

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 descriptive aim of this consciousness functioning. The descriptive aims expressed by the successive choices of an epistemic referential, inside a chain of conceptualization, express the evolution of the descriptive aims of the acting consciousness functioning, and thereby they determine the "direction of conceptualization", step by step. Inside MRC, in its present stage at least, the descriptive aims do not follow from methodological prescriptions. This means the following.

No AI-machine could, by applying MRC, work like a human being, without being directed by a human being. But an AI-machine endowed with an "MRC-program" (if this is possible) and drawn by a man, would work exactly like that man.

This specifies the difference between AI and MRC as well as the particularity of an "MRC-program".

Explicitly rooted in pure factuality, which entails the possibility of a systematic and constructed distinction between potentiality of an infinity of processes of actualization of relative observable manifestations, and this or that actualized observable manifestation (cf. V.2.2). *Thereby it brings in the modal dimension potential-actualization-actualized.*

Radically relativizing. The whole approach bears the seal of the mutual existence of object-entities and views (or, equivalently, of generators of object-entity, and views) and of the relativities of descriptions to the triads $G \propto G, V$.

Methodological, normative, legalizing. MRC is not an attempt at describing the natural processes of conceptualization. Though data (introspective, linguistic, etc.) concerning these natural processes are strongly taken into account, nevertheless MRC recognizes the *impossibility* of a "purely" descriptive account on the processes of description. So, deliberately, it takes distance with respect to such an aim, by constructing definitions and principles conceived in order to optimize the processes of conceptualization in compatibility with definite goals, namely the *a priori* elimination by systematic relativizations of any false absolutization, reflexivity, construction of a conceptual structure with respect to which it be possible to "localize" any other descriptive structure, natural or not, etc. *Thereby MRC is formalized.* Not mathematically and quantitatively formalized, like a modern physical theory, but already formalized, qualitatively formalized.

Finitistic, cellular, local. The fact that the construction of knowledge requires parcellings, steps, is taken into account quite fundamentally throughout MRC, *via* the principle of separation P15 and the concept D16 of relative metadescription.

Globally unlimited. Though everywhere there are strict *local* delimitations of the descriptive quest that withstand any gliding into relativism, globally nowhere a boundary is pre-imposed: *the finalized finitism of MRC generates infinities.*

Hierarchical. MRC generates *hierarchical trajectories* of conceptualization, in contradistinction to the theory of logical types, or that of levels of language, which introduce extended hierarchical *strata*.

Directional and reflexive, endowed with a capacity for an *a priori-a posteriori* double way progression. Before starting a given descriptive cell, a free choice of the direction of conceptualization desired by the observer-conceptor is expressed in a corresponding choice of an epistemic referential. Later the results of this choice can be rejected or kept and developed, on the basis of explicitly defined criteria.

The various features enumerated above are not exhaustive. Nor, by no means, are they mutually independent. Quite on the contrary, they all stem from one core-structure that induces an innumerable host of connections between these features. This core-structure is dominated by the systematically recurrent role of the consciousness-functioning which introduces the epistemic referentials. Along the whole hierarchy of distinct descriptive cells of increasing order

from each chain of conceptualization from the web of such chains, the same fundamental MRC-requirements for a relativized normed conceptualization manifest themselves with a sort of fractality: each time that an epistemic referential has been chosen – no matter on what level of conceptualization – the generator of object-entity, the object-entity and the view from it – no matter of what they consist – entail non removable descriptonal relativities to them.

4.2.8. On the conceptual status of MRC

To what class of conceptual beings does MRC belong ?

Any representation of “natural facts” is more or less normative, never purely descriptonal as the classical myth of objectivity involves. But:

In the case of MRC the explicitly and resolutely *methodological* character is a major feature of the approach. Any confusion between ontological assertions or implications, and methodological constructs, is most carefully avoided.

Nevertheless MRC can also be regarded as:

An attempt at a finitistic representation of the natural processes of generation of meaning where both relativism and false absolutizations are excluded *ab initio* by explicit rooting into pure factuality and by deliberate systematic relativizations.

The fact that throughout the process of constructing MRC one acts “logically”, is neither a circularity, nor does it involve that MRC is reducible to a logic. It only 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 implicitly¹³, but later, at a convenient level of development of the approach, the logical criteria – as it will be shown in V.1 – become *a posteriori* explicitly expressible in MRC-terms. (This sort of inner evolution partakes of the general reflexive character of MRC that has permitted to admit *a priori* the possibility of any pairing (G,V) and to introduce only *a posteriori* criteria concerning the relevance of a given pairing (G,V): first became expressible the criterion of mutual existence D7, and then the subsequent criterion of stability involved in the definition D14.1).

So probably the best characterization is as follows.

MRC is a strongly normative representation of the processes of conceptualization, of which the major specificities are: the place explicitly reserved to the consciousness functioning; the radical descriptonal relativizations; and the fact that it explicates the structure of the very first step in the construction of objectivity, in the course of which intakes of a-[conceptual-linguistic] fragments of pure factuality adduce into language and thought the hard core of scientific objectivity.

IV.3. The Second Stage: an Ideographical Symbolization of MRC

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 neither a formalization *stricto sensu* nor a mathematical representation - permits certain suggestive and economic expressions. In this work I present it simplified and separately. In this way the symbolizations are made 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 Δ 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 by the term “generator” upon a (possibly) of a *radically creative* character of an operation of object-entity generation. Then:

- The “place” from R where Δ works will then be denoted R_{Δ} .

- The object-entity produced by Δ will be denoted by α_{Δ} .

- The *process of delimitation* by Δ , of an object-entity α_{Δ} , will be represented indifferently by

$\Delta R_{\Delta} \Rightarrow \alpha_{\Delta}$ or $\alpha_{\Delta} \Rightarrow \Delta R_{\Delta}$

where the two arrows do *not* have a logical meaning and cannot be considered separately, they are cemented into the global symbolizations which read respectively: “the delimitator Δ , acting on R at the place R_{Δ} , produces the object-entity

¹³ Grize, J.B., (1993) *Pensée logico-mathématique et sémiologie du langage*, in *Pensée logico-mathématique..... Nouveaux objets interdisciplinaires*, Olivier Houdé et Denis Melville, P.U.F. The “natural logic” developed by J.B. Grize is the sort of logic that seems the nearest to that which acts throughout the elaboration of the nucleus of MRC.

α_Δ ", and "the object-entity α_Δ produced by the delimiter Δ that acts on R at the place R_Δ ". Notice that the introduction of these symbolization permits to *distinguish* between:

* Δ : an epistemic operator (in the sense of usual language, *not of mathematics*);

* $\Delta R_\Delta \Rightarrow \alpha_\Delta$: a *process*, that mentions its beginning and its result;

* $\alpha_\Delta \Leftarrow R_\Delta$: an explicit specification of an object-entity *via the process that produced I*, which permits to specify an unobservable object-entity, by the way of producing it.

Thereby the expressivity concerning this zone from MRC is considerably increased.

- An *aspect-view* will be symbolized by the same sign V_g as before;
- The *operation of examination of α_Δ by V_g* will be represented by

$$V_g \alpha_\Delta$$

Notice that the introduction of these symbols permits to *distinguish* between:

* the epistemic operator V_g (in the sense of usual language, *not of mathematics*)

* the *operation of examination $V_g \alpha_\Delta$* .

Which, again is an increase of expressivity.

- A *view* will be symbolized as before by V .
- The *global operation of examination of α_Δ by V* (achieved accordingly to $\pi 11$), will be represented by $V \alpha_\Delta$

The remarks concerning V_g hold also concerning V .

- An *epistemic referential* continues to be represented as before by (Δ, V) .
- The representation of an observer-conceptor $[CF, (G, V)]$ becomes $[\text{⌚} , (\Delta, V)]$.
- The *mutual inexistence* between an object-entity α_Δ and a view V will be symbolized by

$$\nexists \alpha_\Delta / V \quad \text{or} \quad \nexists V / \alpha_\Delta$$

which reads, respectively, "the object-entity α_Δ does not exist with respect to the view V ", "the view V does not exist with respect to the object-entity α_Δ ".

- The *mutual existence* between an object-entity α_Δ and a view V will be represented by

$$\exists \alpha_\Delta / V \quad \text{or} \quad \exists V / \alpha_\Delta$$

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

- A *space-time view* is represented as before by V_{ET} .
- The *frame-principle* can be symbolized in the following way:

$$[\exists \alpha_\Delta / V_g] \rightarrow [\exists V_{ET} : \exists \alpha_\Delta / (V_{ET} \cup V_g)] \\ [\nexists \alpha_\Delta / V_{ET}], \quad \forall V_{ET}, \forall \alpha_\Delta$$

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

- The symbol of a *relative description* $D/G, \alpha_G, V/$ becomes $D/\Delta, \alpha_\Delta, V/$, and the symbol for a *basic relative description* $D^{(0)}/G^{(0)}, \alpha_G^{(0)}, V^{(0)}/$ becomes $D^{(0)}/\Delta^{(0)}, \alpha_\Delta^{(0)}, V^{(0)}/$, and a relative metadescription of order n , $D^{(n)}/G^{(n)}, \alpha_G^{(n)}, V^{(n)}/$, $n=0,1,2,\dots$, is symbolized by $D^{(n)}/\Delta^{(n)}, \alpha_\Delta^{(n)}, V^{(n)}/$.

Together, these symbolizations constitute *the ideographic representation* $[\text{⌚} , \Delta, \alpha_\Delta, V, (D^{(n)}, n=0,1,\dots)]$ of MRC.

V. ILLUSTRATIONS OF THE FUNCTIONING OF MRC

In this section we illustrate by examples the functioning of MRC, thereby also developing the method. We shall first consider logic and then probabilities.

V.1. Classical Logic ¹⁴ versus the MRC-logic of Relative Classes of Cognitive Actions

Because logic is so particularly important when a method of conceptualization is proposed, we shall, by a brief sequence of remarks, try to convey a notion concerning the relations, and the gap, between MRC and classical logic. We shall then very briefly indicate along what lines an MRC-logic can be constructed and what novelties it introduces. It will appear that the MRC-logic achieves an explicit connection between physical factuality and formal structure, and that it disconnects the question of the consistency of a formal system, from the question of decidability (completeness) considered in Gödel's basic theorem, on which it yields a different perspective.

¹⁴ Grize J-B., (1967) *Logique des classes et des propositions*, dans *Logique et Connaissance Scientifique*, Encyclopédie de la Pléiade, Gallimard.

V.1.1. Critical remarks on Frege's basic definitions

Insufficiencies of the concept of Frege-class of a predicate

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

«The expressions whichinclude 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.

From the standpoint of MRC these very first steps call forth already the following remarks.

* In the first place, we are in presence of a qualification ¹⁵ of an object-entity – «the class of P» – of which the generator G is of a particular and so a restrictive type, namely a "generator G(V) of a view V" (cf. final general comments on D14 and V.1.2): V is supposed to act first in the role of a generator G(V) that selects as object-entity the whole field of perceptibility of V ("any value of an object-variable..."), and then it furthermore acts in the role of a view, by qualifying isolately the "values of the object-variable" from this field of perceptibility, but qualifying them from inside the metapredicate "P is true" (cf. the sequel). This very particular sort G(V) of generator of object-entity produces either conceptual object-entities – i.e. already previously achieved descriptions – or basic object-entities that transfer directly on the sensitive biological apparatuses of the human beings, marks called "impressions", without being (notably) changed thereby. It has been already remarked that this last sort of cognitive situation produces basic transferred descriptions that are spontaneously and implicitly metaconceptualized during the very first period of a man's life, and are reduced to intrinsic models (D19.3) that seem to pre-exist independently of observation, "out there", available for examinations of [truths of P's].

Both sorts of descriptions mentioned above, perpetuate a full ignorance of the rooting of conceptualization, in physical factuality.

* In the second place, the qualification « x is P» and the metaqualification of empirical truth of this first qualification, are combined in a sort of coalescence where fundamental MRC-conditions get lost. Indeed from the point of view of MRC the qualification « x is P» is just a piece of meaning, no matter whether true or false, and possibly not even that, if *a posteriori* it reveals no descriptive stability or if it appears that no view of empirical truth can be constructed which exist in the sense of D7 with respect to the assertion « x is P». Whereas in Frege's approach such reservations are totally absent. Moreover the qualification « x is P» is first introduced in a quasi subliminal way, and then it comes into stable being together with, and indistinctly from the metaqualification «it is true (or false) that (x is P)». This conveys the illusory assumption that a truth-qualification is always possible for any qualification « x is P», whatever its semantic content. Which of course is not the case, as Tarski claimed much later («the snow is white » is true iff the snow is white).

* In the third place, the involved predicate P, considered separately, 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 : a sort of ghost-predicate (compare with an aspect-view D5.1 or a view D5.2). Furthermore, as just mentioned, the so feebly formed significance of what is called a predicate P is immediately dissolved in the metapredicate of [truth of P]. While for the metapredicate of [truth of P], again, no structure whatever is specified, nor some condition of relative existence and of effectivity.

In sum, on the one hand, a predicate P and its truth qualifications are assigned the fundamental logical role of producing always, automatically, a proposition, i.e. the tentative assertion of a description, that can be found, *via* some definite procedure, to be true or false. But on the other hand:

The classical predicates "P" are reduced to no more than shadows of *undefined* intensive extracts from factuality, just verbal labels which, while they are hypostatized, are also smuggled away by an immediate translation in terms of a purely extensive domain of correlates "x" inside the realm of object-entities on which they act, this correlation being subjected to another *undefined* meta-intension called truth. A vague but dense knot.

¹⁵ I say "qualification", *not* "description", because no condition of stability of the qualificational result with respect to repetitions of the process of qualification, is required here, as it is in the set of all the definitions D14, starting with D14.1 (with the unique exception of relative testimonies D14.2.2) (cf. the comments on the generalization of D14.1).

* Consider now the «values of x » in general – not only those selected in «classes of P » – and notice that these are the equivalents of MRC-object-entities α_G . Now, no genesis whatever is specified for the «values of x ». They are simply posited to always be "out there", passively waiting to fall inside the field of perceptibility of the predicates P .

Classical logic implies in its foundations a hypothesis of universal actuality. The Boolean algebra of classes and predicates is constructed for the already actualized.

(This, by isomorphy, holds also concerning the nowadays set-calculus on which classical mathematics are founded). Fundamentally, the modal dimension of existence (not to be identified with the "logical" modalities of necessity or possibility) along which potential existence is transformed into actualities by processes of actualization, remains exterior to the classical calculus of classes and predicates. When needed, this dimension has to be superposed by *a posteriori* manipulations. This is not disturbing in the usual language where everything is plethoric, contextual, minimally structured, which for the specific aims of current language is optimal. But in a fundamental formalized representation of thought operations, like logic, the absence of the modal dimension of existence is an imprisoning poverty comparable to what the absence of techniques for the representation of perspective must have been in painting. Only addition to the traditional methods can hinder to perceive to what a degree such a lacuna is amputating, and that, in particular, it is an obstacle in the way of a basic and explicit connection of logic, to conceptual geneses, to aims (finality), to praxis.

* The fact that no genesis is specified for the «values of x » (the MRC-object-entities α_G) has also another consequence, a radical one:

The generators G of the object-entities α_G themselves (not the generators P of the [classes of some P]) are simply not considered.

This absence of an explicitly defined object-entity generator G , *and* required to be in general independent of any qualification and permitted to be physical-operational, restricts *a priori* and arbitrarily the domain of object-entities to which the classical logic can be applied:

In classical logic all the basic physical object-entities that have to be first generated by deliberate physical operations of object-entity-generation, independently of any subsequent qualification, and then might have to be transformed in order to draw from them observable manifestations, are simply eliminated from consideration *a priori*. Indeed "predicates", i.e. linguistic-conceptual qualifiers, cannot "determine classes" among *basic* object-entities in the sense of MRC. They cannot act upon such only factually singularized object-entities, *because they are not homogeneous in nature with these*.

Since the cognitive situation tied with basic physical object-entities, however, is endowed with a certain universality of principle (III.3), we are in presence here of a huge arbitrary amputation. Namely the massive amputation of the whole stratum of conceptualization where the structure of its rooting in physical factuality is specified. In such conditions one can, in particular, well understand why, for classical rationality, quantum mechanics seems unintelligible. Indeed one of the fundamental features of quantum mechanics is precisely the liberation (in general) of any view, of the operation of generation of object-entity. And it is by this liberation that MRC transpierces the armoured platform of language and succeeds to build a representation of the processes of conceptualization that is rooted in physical factuality. But, and this comes as a surprise, not *exclusively* basic physical object-entities are eliminated because the object-entity generators are not explicitly considered. All the *conceptual* entities which are first constructed independently of any qualification and are only afterwards qualified – like many mathematical systems and formal systems of logic itself ! – are equally eliminated. This leads to *false* problems, and to enormous unnecessary efforts to solve them (V.1.2). An amputation of such an extent, and which concerns logic itself, is not acceptable in a fundamental discipline like logic.

Let us make now a second step. By definition:

Two classes of object-entities α and β are *equal* iff all the elements of α are elements of β and vice versa (iff α and β contain the same elements).

Two propositional functions f_α et f_β that determine two classes α and β are *equivalent* if the classes α and β are equal (cf. op. cit., in continuation)¹⁶.

This calls forth a new critical remark.

* How can one know, for instance, whether yes or not for any value of an 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 always be given. But this supposition is founded upon the same restrictive hypothesis identified above 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

¹⁶ Hervé Barreau remarked that precisely these definitions have already been the object of basic criticisms opposed to Frege's logic. This might somehow be related to the remarks that follow in the main text. However here Frege's approach is examined exclusively by confrontation with MRC, and on a level of principle where technical features do not appear.

via the metapredicate [truth of P's], equally always available. But this time it is furthermore implied that a P-examination of a value of an x *never* changes the considered value of that x : if it did, *this* value of the considered x , after having been examined by $P=\alpha$, would in general *cease* to stay available for an examination also by $P=\beta$. Thereby, again but otherwise, are eliminated all the basic transferred descriptions that are so deeply rooted in physical factuality that they have to be changed in order draw from them observable manifestations. Now, in the constructive outline from V.1.2 it will be shown that the basic descriptions, precisely because in general they have to allow for changes of the involved basic object-entity during its processes of qualification, entail certain consequences of strict physical singularity, on logical *form*. But when the rooting of logic in the as yet unknown physical factuality is obtruded, these consequences remain hidden with it, which restricts *a priori* our perception of logical form, to exclusively its plural, statistical aspects.

* This radical occultation, in classical logic, of the features tied with strict physical individuality, is what permitted to claim that logic *is* just formal structure; more, to *require* logic, for the sake of "maximal generality", to be a "pure" syntax, freed of any intension, cut from any semantic matter.

But in fact this severance is illusory. It has been possible to imagine it to be realizable precisely because the way in which unspeakable factuality loaded with semantic potentialities is drawn into descriptions at each local relative zero-point of a descriptive chain, remained so completely ignored. As soon as one becomes aware that any local zero-point contributing to the foundation of descriptive chains, consists of a (more or less canonical) *transferred* description, the illusion of the possibility of a complete elimination from a syntax, of any semantic content, is dissolved. It becomes clear that any syntax stems from numerous bulks of physical factuality, which is the prime matter for phenomenal appearances. It is out of these bulks that are drawn the observable manifestations of which the phenomenal appearances consist, while the whole conceptualization is founded on phenomenal appearances. Through these phenomenal appearances, semantic matter goes over into language-and-conceptualization, by primary codings, and then it irrepressibly diffuses up into all the levels of abstraction and complexification. Language is a circulatory-system *for* factual, semantizable prime matter. It emerged and got form *in order* to carry from mind to mind information about factuality, about semantics. If this were not so the societies of men would not have lasted. They would not even have started being. Our minds work with intensions. These, adduced inside language by the roots of language, have then osmotically impregnated with semantic contents all the levels of abstraction. So, unavoidably, they have infused into logic also, where they generate its natural forms¹⁷, those which, more or less implicitly, command in real circumstances our choices, methods, and actions. If on the other hand in the theoretical formalized logic any connection between syntactical form and semantic content is first refused, this instills there by reaction lacunae and awkward features as well as difficult fictitious problems, like for instance those of the *a posteriori* connectivity of modern formal logic with modern semantics. (Try to first design *in abstracto* the human circulatory system, strictly without using as a guide the condition that *blood* has to circulate in it *in such* a way as to nourish every tiny volume of living tissue: what is the chance afterward to find the natural scheme ?).

Critics on the classical logical void \emptyset : the semantic relativities of \emptyset

A trivial but striking example of the way in which ignorance of semantic aspects induces syntactic insufficiencies, is that of equality of all the void classes.

In consequence of the extensive (set-theoretic) 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 \emptyset . 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. 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 degree of "numericity" N of any (finite) number, so the predicate $P=N$ of which mathematics studies the manifestations *via* the object-entities called "numbers", of which a quite general property is to be able to "measure", to quantify. It is the prolongation into material nothingness of numericity, of this particular 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 by use of $P=N$ the quantity of supports of a given quality $P \neq P'$ – 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 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: at this limiting point, the conservation of the way of representing a class breaks down, a *solution of continuity* inside the way of representing a class has been surreptitiously introduced. This is a heavy methodological error, comparable, for instance, to a dimensional inhomogeneity inside an equation. The non homogeneity of conceptual treatment inside a closed conceptual system is 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 an exclusively *intensive* way, even if this characterization possessed also an extensive counterpart: a predicate P is *only* quality, and, by definition, it is P *alone* that determines the

¹⁷ Cf. note 34.

corresponding class f_P , not also the quantity of carriers of the quality P. It is then inconsistent, if one distinguishes clearly between quality and [quantity of supports of this quality] (between views V and object-entities α_G that exist in the sense of D7 with respect to this view), to permit the *defining* quality to disappear "because" all its *supports* disappeared, while *the class itself, defined by the quality, is still maintained*. The predicate P that defines the class f_P should subsist with the class, in spite of the vanishing-support-of-quality-P, i.e. when the set of numbers that label the supports reduces to the number 0. It is inconstant to end up in such a materialist idolatrous manner when one has begun by adoring an abstract God. One should act like the mathematicians, or like Lewis Carroll who leaves us with smile-of-cat-without-cat when the smiling-cat vanishes completely.

The logical void \emptyset – which is an element of the "purely" syntactical system called the classical logic of classes and predicates – is subjected to *semantic relativities* that require a *specific syntactical expression*: the asserted possibility of a radical separation between syntax and semantics is obviously contradicted in the case of the logical void.

Ferdinand Gonseth said that «logic is the physics of any object». But any given object has some semantic content, and the types of semantic content have to be mutually distinguished in a thoroughly worked out formal representation of safe derivational vehiculations of our knowledge concerning empirical truth-valuations involving "any" object.

Global critical conclusion

The classical logic of classes and predicates, which founds the whole modern classical logic, floats above language, inside the stratum of the already pre-verbalized-conceptualized. The rooting of the processes of conceptualization, in physical factuality, the creative cognitive actions which produce object-entities and qualifiers of these, the modal dimension of existence, remain hidden to it. By occultation of the genetic stages from the processes of conceptualization and by substitution to these of false hypostatizing absolutizations, it introduces arbitrarily restricted conceptual platforms that cannot withstand artificial and inadequate formal representations.

Only when all the involved descriptonal geneses, with the descriptonal relativities entailed by them, are explicitly taken into account, is it possible to dominate from a formal point of view any descriptonal situation, whatever its complexity. This can be better understood *per a contrario* and on examples.

For instance, inside MRC where any descriptonal relativity is taken into account explicitly as soon as it comes into play, the treatment of the logical void is preorganized in consequence of the way in which the very first levels of general conceptualization are structured. As soon as one considers an (independently defined) object-entity α_G and a view V (D4 and D5), the test of their mutual existence in the sense of D7 is methodologically required, *before* trying to perform the corresponding relative description. If this test is negative one finds oneself precisely in the case that can be designated as «the void class determined by V inside the set of object-entities α_G », which means «absence of object-entities α_G admitting of the qualification V», i.e. absence of the possibility of a meaning generated by the pair (G,V). So a conceptual void, doubly relativized to the semantic features involved by the considered pair (G,V), comes into being *ab initio*. Later, once the possibility of meaning has been insured by mutual existence in the sense of D7 and then a first descriptonal level has been insured by the existence of some stability of the qualifications in the sense of D14.1, comes furthermore into consideration, in its turn, the question of empirical truth: given an already achieved description in the sense of one of the definitions D14, is this description a proposition, i.e. does it exist in the sense of D7 with respect to some view of empirical truth that can be effectively exhibited? The still higher and more particular level of "logical" characterizations concerns object-entities consisting of systems of propositions. A proposition from a formal system of propositions S, can be described by the logical views of provability inside S of decidability inside S, while the system itself considered as a whole can be examined by the logical views of completeness and of formal consistency. All the mentioned sorts of logical description are related with the previously developed relativized conceptual-semantic voids. Indeed these *entail* the definability of syntactical, calculational relativized voids (V.1.2) and thus they go over into the logical descriptions. So in this specific case it is clear that, and how, inside MRC the semantic contents determine progressively aspects of logical form. And these, the calculational relativized logical voids, preserve from a whole category of false problems. Indeed the absolutization of the logical void is one of the most prolific sources of illusory problems. (Even in nowadays quantum logic there subsists much confusion concerning complementations tied with the logical void ¹⁸ (cf. also ref. 16 as well as V.1.2)).

When instead of a system of propositions, a formal system in the most abstract sense is considered, either any connection between semantics and syntax has deliberately been suppressed by the process of conceptualization (which is difficult) and then one obtains just a Wittgensteinian "game" that resists any non distorting and useful interpretation in terms of some domain of natural facts, or some connections between semantics and the constructed formal system have been deliberately preserved, and then precisely these insure possibilities of useful interpretations of this system.

The corpus of relativizations required by MRC does not only insure a controlled penetration of semantics into the logical descriptions, it also exerts another crucial sort of control which classical logic cannot exert systematically because

¹⁸ Hadjisavvas N., Thieffine F., Mugur-Schächter M., (1980) *Study of Piron's System of Questions and Propositions*, Found. of Physics, Vol. 10, No 9/10.

of the artificial separation between semantics and syntax. Namely it insures automatically all the types of descriptonal "homogeneity" consisting of the conservation of the method of representation inside a closed descriptonal universe, i.e. throughout the work accomplished with a given epistemic referential. While the principle of separation P15 regulates the passages from one set of homogeneous descriptonal contents, whatever their type, to another one. This is important. Indeed the creation of sense, in all its stages, is ruled by the implicit imposition of methodological principles of homogeneity: physical operations can change only physical entities, concepts can change only concepts and can be localized only inside nets of concepts; in an equation the semantic dimensions from the first member must be the same as the semantic dimensions from the second member; statistical-probabilistic qualifications do not exist in the sense of D7 with respect to individual events, nor with respect to only statistical distributions of 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. When no matter which one among these various sorts of implicit principles of homogeneity is violated, paradoxes or false problems emerge. Inside MRC this is always expressed as a consequence of a violation of the principle of separation P15, i.e. of a non explicit modification of the epistemic referential which is made use of.

The false absolutizations that flaw the classical logic of classes and predicates have prolongations in many domains of modern science, in particular in the theory of sets. 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. But the most noteworthy consequence might consist of the fact that *classical logic, because of its lack of explicit connection with strictly singular physical factuality, remains unaware of the space-time specificities of the descriptions of natural physical object-entities*. This has favoured a surreptitious gliding

conceptualization → natural logic → formal logic → calculus → computation

whereby, in computational simulations of physical processes, understanding disappears into mere doing.

V.1.2. Outline of an MRC relativized genetic logic

The preceding critical considerations entail by contrast a constructive approach of which what follows conveys only an extremely synthetic notion. The aim is, inside MRC, to explicate the consequences upon logical descriptions, of the relativization to the cognitive actions from which these logical descriptions stem, so also to the semantic contents introduced by these cognitive actions. The main step is the introduction of the concept of genetic class.

Double extremity genetic classes

Let us recall that inside MRC what is called "object-entity" is just a descriptonal role (final comment on the general concept D14 of a relative description). No entity never pre-exists *as an object-entity*. It always has to be introduced in the role of object-entity by the explicit action of a definite operation G which either radically creates – physically or conceptually – an actor for this role, or only recruits some pre-existing entity for acting in this role. This, in general, is done independently of any pre-established qualification of, specifically, the object-entity introduced by the chosen operation G, so also independently of any "predicate P" (cf. comment on D14.3.1). Only after having been thus put, via G, in the role of object-entity, becomes the involved entity available for the action on it of a view (D5.1, D5.2) – any one – which, in its own turn, is chosen for acting in the role of a view. The necessity of an apparently so redundant and intricate way of saying can be best understood when the chosen epistemic referential has the particular degenerate form (G(V),V) where G(V) is the "generator of the view V" (cf. the general final comment on D14; V denotes here indistinctly an aspect-view or a view while if specifically an aspect-view is meant, we write V_g) which is precisely the form presupposed implicitly by the whole classical logic. Indeed in this case the view symbolized by V, though from the beginning on it is structured accordingly to the definitions D5.1, D5.2 of qualificators, nevertheless acts first in the role denoted G(V) of generator of object-entity. Namely it acts first either by selecting as object-entity its own field of perceptibility, or by radically creating this field, like for instance in the case of the generation of a microstate by a quantum mechanical measurement process. And afterward, on the product of this first action accomplished by itself but in the role G(V) of generator of object-entity, V can furthermore act also in the role of a view or an aspect-view, for which its initial definition has been specifically intended. Let us also recall that what is structured as an aspect-view or a view in the sense of D5.1 or D5.2 respectively, can be selected for the role of object-entity, by a convenient generator (here a conceptual selector) (cf. the final general comment on D14). The existence of situations like those mentioned above requires indeed ways of speaking that distinguish clearly between the general descriptonal roles, and the specific actors to which the roles are assigned. This distinction is quite essential because according to MRC, in order to describe, both the role G and the role V have always to be acted, even if in a reduced or a degenerate way and which reflects also the characteristics of the particular actor put to hold the role. So inside MRC it would be neither necessary nor sufficient to consider, as it might seem natural at a first sight, that the equivalent of a "predicate P" is just an aspect-view V_g . In order to achieve qualifications, MRC requires to make systematically use, instead of just a "predicate P", of some definite *succession* $[G.V_g]$ or $[G.V]$ of an actor put in the role G followed by an actor put in the role V.

So far the relative description $D/G, \alpha_G, V/$ produced by an epistemic referential (G,V), once obtained accordingly to one of the definitions D14, has been considered separately from its genesis. By the following definition DL.1 (L: logical) we shall now introduce a synthetic concept that takes systematically into explicit account, together with a given description, also the whole genesis involved by it.

DL.1. Double-extremity genetic class. Consider an epistemic referential (G,V) where V is a view containing in general several aspect-views and which exists in the sense of D7 with respect to the generator G of object-entity.

DL.1.1. Double-extremity genetic class involving a physical object-entity. Suppose that (G,V) introduces a physical object-entity and that it does produce a relative description $D/G,\alpha_G,V/$ of it in the sense of the definition D14.1, individual or probabilistic. Then the repetitions of the succession $[G.V]$ of pairs of cognitive actions, constitute [the class of all the operational processes of gk -valuations involved by $D/G,\alpha_G,V/$] (in this context the term "operational" is intended to stress that no model whatever is asserted. The class specified above will be called a *double extremity genetic class involving a physical object-entity*, in short a physical genetic class, and will be labelled $C_{ph}[G.V]$).

If V consists of only one aspect-view V_g an aspect-description $D/G,\alpha_G,V_g/$ is obtained, and the succession $[G.V_g]$ produces [the class of all the operational processes of gk -valuations involved by $D/G,\alpha_G,V_g/$]. We name this a *one aspect double-extremity genetic class involving a physical object-entity*, in short a one aspect physical genetic class, and we label it $C_{ph}[G.V_g]$.

When a basic referential $(G^{(o)},V^{(o)})$ is considered, a basic transferred description $D^{(o)}/G^{(o)},\alpha_G^{(o)},V^{(o)}/$ is obtained, and the corresponding genetic class will be called a *basic genetic class*; such a class will be denoted $C[G^{(o)},V^{(o)}]$. This is [the class of all the operational basic processes of gk -valuations involved by $D^{(o)}/G^{(o)},\alpha_G^{(o)},V^{(o)}/$].

DL.1.2. Genetic class involving a non physical public object-entity. Suppose that (G,V) introduces a non physical public object-entity and that it does produce a relative description $NPP.D/G,\alpha_G,V/$ of it in the sense of D14.2.1. Then the repetitions of the succession $[G.V]$ constitute [the class of all the processes of gk -valuations involved by $NPP.D/G,\alpha_G,V/$]. The class specified above will be called a *genetic class involving a non physical public object-entity*, in short a non physical public class, and will be labelled $C_{NPP}[G.V]$. In particular V can consist of only one aspect-view V_g and then we have a class $C_{NPP}[G.V_g]$.

DL.1.3. Testimonial double-extremity genetic class. Suppose that (G,V) does not insure the possibility to realize arbitrarily many repetitions of the successions $[G.V_g]$, for all the aspect-views V_g from V . So it produces an only testimonial description $\theta/G,\alpha_G,V/$ in the sense of D14.2.2. Nevertheless according to MRC in this case also a certain set of known or unknown implicit qualifying processes $[G.V_g]$ have necessarily been involved: if not, there would be no qualification at all (cf. general comments on the definitions D14). These will be said to constitute *the double-extremity genetic class of the testimony θ* . Such a class will be indicated by the notation $C_\theta(G,V)$ where only the involved epistemic referential is specified.

Comment. The general concept of a genetic class is posited here as the MRC-equivalent of the Frege-class of a predicate P .

The distinction between a relative description $D/G,\alpha_G,V/$ (or a relative testimony) – i.e. exclusively the final global result of the processes of qualification produced with the considered epistemic referential (G,V) – and the corresponding genetic class, draws attention upon the absence, in the classical logic of classes and predicates, of any reference to the epistemic actions involved by an "object-variable x " or a "predicate P ". Thereby is brought into full light the contrast between the active conception on knowledge involved by MRC, and the passive, hypostatizing and absolutizing implications of classical logic.

In a genetic class the undefined, hypostatic shadow-predicates P are replaced by the views V founded upon aspect-views V_g obeying the definition D5.1, which consist of effective operations and tests incorporated to a definite conceptual-operational structure. While the hypostatic object-variable x is replaced by a definite operation of generation G associated with the object-entity α_G produced by it, an operational-conceptual pair (G,α_G) that opens up the possibility to grasp and to draw up into conceptualization bulks of physical factuality of which the semantic matter nourishes with meaning all the levels and sorts of description, the logical one included. Any unnecessary absolutization is suppressed by the fact that a view is explicitly allowed to act in the role of generator of object-entity (labelled $G(V)$) while both views and generators are allowed to play in other descriptions the role α_G of object-entity. The specificity of the concept of generator introduced by the definition D4 is not in the least diminished by this absence of strict solidarity with the descriptonal role G , nor is the specificity of the concept of a view V as defined by D5.1 and D5.2, diminished by the absence of a strict solidarity with the role of view. So inside a double-extremity genetic class, the classical object-variables and predicates – abstract, vague, hypostatic, absolute, as if out of reach of human action – transmute into a quite definite and complex operational-conceptual whole of relativized and constructive epistemic action.

The concept of genetic class $C[G.V]$ obliges to start by considering first a set of qualifications obtained on the product α_G of only *one* definite generator G of an object-entity. But this restriction appears just below to be suppressible *a posteriori* as much as one wants.

Outlook on a calculus with double-extremity genetic classes

In what follows we consider exclusively genetic classes involving stable relative descriptions in the sense of the definitions D14.1, D14.2.1, or D14.3.1 (the genetic classes of testimonial descriptions are too vaguely defined to be included in a calculus). Furthermore we drop the lower indexes P or NPP and write uniformly $C[G.V]$.

The logical operations, sum, intersection, complementation, must all be redefined step by step for the case of genetic classes, in a way fully relativized to the involved generator G and to the whole content of the acting view V . The reconstruction requires the definition of *laws of composition* of object-entity generators G , of object-entities α_G , of views V , and of descriptions D (accordingly to P8 and P10), and it has to be carried out for all the possible *sorts* of compositions of genetic classes $C[G.V]$ (two classes with both G and V different, or with the same G and different V , or with different G 's and the same V , or a basic class $C[G^{(0)}.V^{(0)}]$ and a non-basic one, or two basic classes, or two non-basic classes (of same order or of different orders), or an aspect-class $C[G.V_g]$ and a general one $C[G.V]$, etc.). For instance:

Consider the two genetic classes generated by the successions $[G_1.V_1]$ and $[G_2.V_2]$, both not basic. Then the involved object-entities α_{G_1} and α_{G_2} are conceptual (previously achieved descriptions, or intrinsic metaconceptualizations, or intrinsic models) while the final global results are two descriptions D_1 and D_2 . Suppose now $(G_1 \equiv G_2) = G$ and $V_1 \neq V_2$. Then only one object-entity α_G is involved and the intersection $[C[G.V_1] \cap C[G.V_2]]$ leads to an (absolutely) void result if V_1 and V_2 involve no common aspects; while if V_1 and V_2 do involve common aspects this intersection yields a description containing the qualifications present in both D_1 and D_2 , so one can pertinently say that the resulting description is the intersection (or product) $D_1 \cap D_2$ of D_1 and D_2 which can be denoted $D_{\cap 12}$. In the same conditions the union $[C[G.V_1] \cup C[G.V_2]]$ produces a final description that can also be pertinently called the sum of D_1 and D_2 and can be denoted $D_{\cup 12}$. Suppose now on the contrary $G_1 \neq G_2$ and $(V_1 \equiv V_2) = V$. Then according to the nucleus of MRC the view V yields a (meta)description of the metaobject-entity $\alpha_{G_1 \cup G_2}$ where all the qualifications from D_1 and all those from D_2 are contained, so one could speak, for instance, of the description of an *object-sum* and introduce the notation $D_{\cup \alpha 12}$ with $D_{\cup \alpha 12} \equiv D^{(2)}/G^{(2)}, \alpha_G^{(2)}, V^{(2)}$ where $G^{(2)}$ selects the sum-object-entity $\alpha_G^{(2)} \equiv \alpha_{G_1 \cup G_2}$ and $V^{(2)} \equiv V$. Etc.

The last example entails that the classical definition of the class of a predicate can be progressively approached inside the MRC-logic by composing additively an increasing number of genetic classes with distinct generators of object-entity and identical views.

In any case the global result of a permitted composition of genetic classes $C[G.V]$ is just a relative description.

Each class $C[G.V]$ introduces various semantically relativized voids tied with corresponding semantically relativized complements.

Given a qualification (gk) from $C[G.V]$, it introduces its own relative void – let us label it $[\emptyset/(gk)]$ – that sends to the corresponding relative complement consisting of the set $\{(gk)'\}$, $(gk)' \neq (gk)$, of all the other qualifications from $C[G.V]$; analogously an aspect-view $V_g \in V$ introduces the relative void $[\emptyset/V_g]$ that sends to the complement consisting of the set $\{g'\}$, $g' \neq g$, of all the other aspects from V , so to the set of all the qualifications $g'k$ from $C[G.V]$ produced by the aspect-views from V that are different from V_g . These were examples of relative voids internal to the genetic class $C[G.V]$, i.e. which send to complements contained in $C[G.V]$. If now G and V are regarded as wholes, the genetic class $C[G.V]$ introduces three relativized metavoid $[\emptyset/G]$, $[\emptyset/V]$ and $[\emptyset/G,V]$ which send to complements from the outside of $C[G.V]$, namely to the three exterior metacomplements with respect to, respectively, G , or V as a whole, or the referential (G,V) as a whole (there is no difficulty to characterize these metacomplements by words).

So a genetic class $C[G.V]$ introduces a hierarchical organization of relative voids and of corresponding relative complements sending into definite domains of observation or epistemic action. We are already far from the connection between a hypostatized "object-variable x " and a hypostatized predicate P – always just a conceptual selector – *associated with only one absolute void*. Now, the qualifications gk , the aspect-views V_g , and the generators G , are all semantic descriptonal elements which determine semantic relative voids and the corresponding semantic complements; but, *via* the symbols that represent them, these semantic relative voids and complements go into the calculus with genetic classes where they become "logical" voids and complements that imprint their mark upon a syntax.

We are in presence here of an example in which one can see how semantic features gain access toward a specific syntactical expression. What appears on the horizon is a syntax of the extraction and elaboration of semantic matter, a syntax of conceptualization, where the artificial and illusory frontier between semantics and syntax is transcended.

The calculus with genetic classes it not yet elaborated, but nothing hinders to elaborate it. It will have to be worked out in compatibility with the whole content of the nucleus of MRC. In particular all the restrictions or methodological rules involved by the frame principle P8, the principle P10 of individualizing mutual exclusion, and the principle of separation P15 with the concept of relative metadescription D16 entailed by it, will have to be taken into

account systematically. Inside the enlarged framework created by this calculus, the concept of proof will require reconstruction.

These brief indications suffice for conveying a first notion concerning the content and the degree of novelty and complexity of the calculus with genetic classes.

Views of empirical truth. Relative proposition

Consider a genetic class $C[G.V]$. It involves as its final global result a corresponding relative description $D/G, \alpha_G, V/$, i.e. some *specified* structure of space-time-gk-values (where one or both frame-aspects of space and time can be absent), the aspect-index g running over the aspect-views $V_g \in V$. Now, following Tarski in this respect, we note that the mere assertion of the description $D/G, \alpha_G, V/$ is not itself what is called a proposition. It generates a proposition if and only if $D/G, \alpha_G, V/$ can be asserted to be empirically true (this is the MRC way of saying like Tarski that [\ll the snow is white \gg is true iff the snow is white]). Indeed only a *previously* constituted description can be empirically true or false. Or it cannot (think of the description of a minotaur). For instance, a basic object-entity cannot exist in the sense of D7 with respect to an aspect of empirical truth, because it does not exist with respect to *any* view of comparison ($\pi 18.1$) while an aspect-view of empirical truth is an aspect-view of comparison. Indeed it must somehow compare the mere assertion of the considered description, with some perceptions of empirical facts to which this assertion refers; it must somehow be a view of "verification" able to establish identities or non-identities concerning, on the one hand the *assertion*, for a definite object-entity, of definite aspect-values gk of definite aspects g , and on the other hand the *effective emergence* for that object entity, of precisely those asserted gk -values, when it is examined *via* that aspect g .

So, quite essentially, each aspect of empirical truth is a meta-aspect which is *relative* to an aspect g involved in the description that has to be "verified". Like in any identity-valuation, the (two) meta-(aspect)-values of a meta-aspect of empirical truth, namely "true" or "not true" (false), are *inconceivable* in an absolute sense, they can be imagined only relatively to some definite gk -value of a definite aspect g . If $D/G, \alpha_G, V/$ is an individual description, then one can desire to establish for each gk -value asserted by $D/G, \alpha_G, V/$ whether it is true or false; and if $D/G, \alpha_G, V/$ is a probabilistic description one can desire to establish whether the probabilistic distribution asserted by it for the values gk of the aspect g is true or false; so one can also ask: "is $D/G, \alpha_G, V/$ true with respect to all the gk -values or all the distributions of gk -values asserted by it?". But to research a valuation of empirical truth of $D/G, \alpha_G, V/$ concerning no specified gk -value or distribution of gk -values, would obviously be meaningless. So we introduce the following definition:

DL.2. Meta[aspect-view] or view of empirical truth. Consider a meta[aspect-view] consisting of one meta-aspect $(\epsilon\tau/g)$ which is relative to an aspect g in the sense of D5.1. Let us designate it by $[V^{(2)}_{(\epsilon\tau)/g}]$. The meta-aspect $(\epsilon\tau/g)$ from $[V^{(2)}_{(\epsilon\tau)/g}]$ is posited to contain only two aspect-values, namely $(\epsilon\tau/g)1 =$ "true with respect to g " and $(\epsilon\tau/g)2 =$ "false with respect to g ". Accordingly to the general definition D5.1 of an aspect-view – which concerns any aspect of any order – each meta-aspect $(\epsilon\tau/g)$ must introduce a *definite* and *effective* corresponding operation of $(\epsilon\tau)/g$ -examination, as well as an explicit *coding rule* for deciding which results of the $(\epsilon\tau)/g$ -examination are to be coded "true with respect to g " and which ones are to be coded "false with respect to g ". A meta[aspect-view] of the specified sort will be called a *meta[aspect-view] of relative empirical truth* ($\epsilon\tau$: empirical truth). A view containing two or more meta[aspect-views] of relative empirical truth will be called a *metaview of empirical relative truth* and will be symbolized by $V^{(2)}_{(\epsilon\tau)}$.

Comment. Consider a previously achieved description $D/G, \alpha_G, V/$ and a metaview of relative empirical truth $V^{(2)}_{(\epsilon\tau)}$. If $V_g \in V$ and $V^{(2)}_{\epsilon\tau}$ contains a meta-aspect-view $[V^{(2)}_{(\epsilon\tau)/g}]$ of empirical truth relative to g that is *effective with respect to α_G* , then $D/G, \alpha_G, V/$ and $V^{(2)}_{\epsilon\tau}$ do mutually exist in the sense of D7 with respect to g . In this case $V^{(2)}_{\epsilon\tau}$ is able to qualify the empirical truth of $D/G, \alpha_G, V/$ with respect to that aspect g . If this is not the case, then with respect to that g the description $D/G, \alpha_G, V/$ and the metaview $V^{(2)}_{\epsilon\tau}$ do not mutually exist in the sense of D7 and $V^{(2)}_{\epsilon\tau}$ is not able to qualify the empirical truth of $D/G, \alpha_G, V/$ with respect to g . If $D/G, \alpha_G, V/$ and $V^{(2)}_{\epsilon\tau}$ do mutually exist in the sense of D7 with respect to all the aspects g involved by V , then $V^{(2)}_{\epsilon\tau}$ can yield for $D/G, \alpha_G, V/$ a *complete* valuation of empirical truth.

It follows that according to MRC the concept of empirical truth possesses some *meaning* relatively to $D/G, \alpha_G, V/$ only if it is possible to construct at least one metaview $V^{(2)}_{\epsilon\tau}$ of empirical truth which exists in the sense of D7 with respect to $D/G, \alpha_G, V/$. But this condition is far from being always insured (as it often seems to be implied). It is a rather restrictive condition, because of the requirements of definiteness, effectivity and codability entailed for any $\epsilon\tau$ -examination by the general definition D5.1. Indeed, of what can an $(\epsilon\tau)/g$ -examination consist? One possibility is that it consists of a mere repetition of the V_g -examination itself which inside the genetic class $C[G.V]$ leads to this or that aspect-value gk , or this or that probabilistic distribution of gk -values asserted by $D/G, \alpha_G, V/$, followed by a comparison between the result obtained in the re-production and the result asserted by $D/G, \alpha_G, V/$ (the aim of the condition of re-producibility currently imposed in the "exact" experimental sciences like experimental physics, chemistry, molecular biology, is precisely to insure possibility of $(\epsilon\tau)/g$ -examinations of the type specified above). But re-producibility is

relatively rare, even for descriptions of physical facts¹⁹, and even for descriptions of physical facts that belong to what is called an exact natural science. In history, palaeontology, human biology, police researches, current life, etc., one is in presence of just testimonial qualifications in the sense of D14.2.2 with respect to which other sorts of definite, effective and codable $(\epsilon\tau)/g$ -examinations must be invented, and in many cases this simply is not possible. As for religious, metaphysical, mythical, poetical testimonial qualifications, the meaninglessness of any relative metaview of empirical truth is entailed by the very content of the testimonies.

Consider now a description $D/G, \alpha_G, V/$ for which a complete metaview $V^{(2)}_{\epsilon\tau}$ of empirical truth has been constructed. Then the valuations of empirical truth of $D/G, \alpha_G, V/$ achieved *via* the $(\epsilon\tau)/g$ -examinations involved by $V^{(2)}_{\epsilon\tau}$ are in a non removable way relative to these particular examinations. In general $V^{(2)}_{\epsilon\tau}$ is not unique, and with another metaview $V^{(2)}_{\epsilon\tau}$ involving other $(\epsilon\tau)/g$ -examinations one obtains in general other truth-valuations.

In consequence of the relativizations specified above, the questions of empirical truth become precise and they admit of definite but only relative solutions. *This stands in polar opposition with relativism.*

The conception on empirical truth exposed above can rather obviously shown to be in essential agreement with K. Popper's concept of "relativity of truth to theory", as well as with H. Putnam's views. While Quine, Kuhn, and many other important thinkers, put less or no accent on the definiteness and effectivity required for an $(\epsilon\tau)/g$ -examination, so in their writings the question of empirical truth, like that of reference, seems to involve a general and irrepressible doom to relativism.

We can now define a relativized concept of proposition:

DL.3. Relative proposition. Consider a description $D/G, \alpha_G, V/$ for which it has been possible to construct a complete metaview $V^{(2)}_{\epsilon\tau}$ of relative empirical truth. Consider the metadescription $D^{(2)}/G^{(2)}, \alpha^{(2)}, V_{\epsilon\tau}^{(2)}/$ where: the metaobject-entity is $\alpha^{(2)} \equiv D/G, \alpha_G, V/$ (introduced by a corresponding meta-generator $G^{(2)}$, namely a conceptual selector); $V_{\epsilon\tau}^{(2)}$ is a metaview of empirical truth that exists in the sense of D7 with respect to $D/G, \alpha_G, V/$, the results of all the involved $(\epsilon\tau)/g$ -examinations being *a priori* asserted – *tentatively* – to consist only of the relative truth-values "true with respect to the aspect g" for all the $V_g \in V$, which remains to be validated or invalidated *a posteriori* by the effective realization of all the $(\epsilon\tau)/g$ -examinations involved by $D^{(2)}/G^{(2)}, \alpha^{(2)}, V_{\epsilon\tau}^{(2)}/$. Because the specified tentative assertion is a "proposition" in the etymological sense, $D^{(2)}/G^{(2)}, \alpha^{(2)}, V_{\epsilon\tau}^{(2)}/$ will be called a *proposition relative to $D/G, \alpha_G, V/$ and to $V^{(2)}_{\epsilon\tau}$* and will be labelled $p(D)$. It can consist either of the global, integrated formulation « $D/G, \alpha_G, V/$ is true (or false) with respect to $V^{(2)}_{\epsilon\tau}$ » or of the set of all the analyzed formulations « $D/G, \alpha_G, V/$ is true (or false) relatively to $V^{(2)}_{\epsilon\tau}$ in its assertion concerning that value g_k of that aspect g (or relatively to its assertion of the distribution of g_k -values of g)».

Comment. *Via* the MRC-concepts of metaview of empirical truth and of relative proposition, the calculus of genetic classes $C[G.V]$ leads to a corresponding relativized calculus of propositions, where the truth-value of the final description produced by a composition of genetic classes $C[G.V]$ has to be established as a function of: the nature of the composition; the involved metaviews of empirical truth; the values of empirical truth assigned *via* these, to the descriptions produced by the classes involved in the considered composition of classes. So, while in the classical approach a truth-valuation is from the beginning on involved in the definition of the class of a predicate P , in the MRC genetic logic the genetic classes are clearly separated from the corresponding propositions, of which the truth-valuations require different, explicit, analyzed, non-trivial relative specifications. This, at a first sight, might seem to be a huge complication, to be avoided at any price. But in fact it is a complexification of the treatment that can determine with any desired precision the configuration of the channels along which semantic matter is adduced into logical syntax.

A non-classical logical stratum concerning strictly singular physical factuality

Consider a basic genetic class $C[G^{(o)}, V^{(o)}]$. Even if the basic description $D^{(o)}/G^{(o)}, \alpha^{(o)}, V^{(o)}/$ involved by this class is called "individual", in consequence of the condition of stability from the general definition D14.1 and its particularization D14.3.1, it involves nevertheless a big number of repetitions of the realization of each succession $[G^{(o)}, V^{(o)}]$.

The epistemic action leading to $D^{(o)}/G^{(o)}, \alpha^{(o)}, V^{(o)}/$ as a whole, no matter whether $D^{(o)}$ is individual or probabilistic, is always directly placed on the level of statistics.

¹⁹ For instance if the verbal expression of $D/G, \alpha_G, V/$ is «yesterday at 14h35' a grain of dust carrying on it a germ X has left my pillow» it seems highly improbable to be able to construct for it some meta[aspect-view] of empirical truth founded on reproducibility. In experimental physics, in chemistry, biology, etc., the specification of metaviews of empirical truth founded upon reproducibility, that be acceptable from all the points of view, constitutes a basic part of the research.

However, by penetrating *inside* $D^{(o)}$ and taking into account only two distinct successions $[G^{(o)}.V_{g_1}^{(o)}]$ and $[G^{(o)}.V_{g_2}^{(o)}]$, it is possible, by use of the concept D14.2.2 of testimonial description, to dig down to the level of the strictly individual qualifications, and to define for these a *semantical* character which determines a certain corresponding *logical form*. This is an innovation with respect to classical logic. We proceed as follows.

Consider two successions $[G^{(o)}.V_g^{(o)}]$ and $[G^{(o)}.V_{g'}^{(o)}]$ that have been realized either with $g'=g$ or with $g' \neq g$, no matter, but have led to two different aspect-values $gk \neq gk'$ or $gk \neq g'k'$, respectively. These two successions – with their outcomes included – do not insure a test of descriptonal stability as required by D14.1 or D14.3.1. So they are not descriptions in the sense of the mentioned definitions, they are just two testimonies in the sense of D14.2.2, say θ_1 and θ_2 . Now, *because* θ_1 and θ_2 involve by hypothesis two **distinct** registered aspect-values, *each one of these testimonial descriptions requires its own realization of a replica of the object-entity* $\alpha^{(o)}$ *produced by* $G^{(o)}$. So, if we label $\alpha_j^{(o)}$ **one** given realization of a replica of the basic object-entity $\alpha^{(o)}$, the two testimonies $\theta_1(\alpha_j^{(o)})$ and $\theta_2(\alpha_j^{(o)})$ are mutually incompatible.

As soon as a restriction to only *one* definite **replica** $\alpha_j^{(o)}$ of a basic object-entity $\alpha^{(o)}$ is posited – not only restriction to no matter how many replicas of one sort of basic object-entity $\alpha^{(o)}$ as defined by a given operation $G^{(o)}$, but furthermore restriction also to only one replica of that sort of basic object-entity –, there arises a mutual incompatibility between the factual realizability of $\theta_1(\alpha_j^{(o)})$ and that of $\theta_2(\alpha_j^{(o)})$. *This holds even if the qualifications involved by* θ_1 *and* θ_2 *concern both one same basic aspect* g .

This is a mutual exclusion of a semantical nature. But *via* the concept of empirical truth it entails a logical consequence. To show this we proceed as follows. To begin with, we define:

DL.4. Basic relative testimonial proposition. We call *basic relative testimonial proposition* and we label $p(\theta^{(o)})$ the tentative assertion of the empirical truth of a relative basic testimony $\theta/G^{(o)}, \alpha^{(o)}, V_g^{(o)}$ (with respect to some definite view of empirical truth $[V^{(2)}_{(\epsilon\tau)/g^{(o)}}]$ supposed to have been constructed); which tentative assertion remains to be validated or invalidated *via* the $(\epsilon\tau)/g^{(o)}$ -examinations involved by $[V^{(2)}_{(\epsilon\tau)/g^{(o)}}]$.

Comment. A basic aspect of empirical truth concerning a basic testimony $\theta/G^{(o)}, \alpha^{(o)}, V_g^{(o)}$ can consist, for instance, of the consensus concerning the genesis and the outcome of the testimony θ , among an arbitrarily big number of observers that have watched and witnessed together these non repeatable phenomena.

So to the two testimonies $\theta_1(\alpha_j^{(o)})$ and $\theta_2(\alpha_j^{(o)})$ there correspond two testimonial propositions $p_1[\theta_1(\alpha_j^{(o)})]$ and $p_2[\theta_2(\alpha_j^{(o)})]$. Now since $\theta_1(\alpha_j^{(o)})$ and $\theta_2(\alpha_j^{(o)})$ cannot be both realized because they involve by hypothesis one same replica $\alpha_j^{(o)}$ of the involved basic object-entity $\alpha^{(o)}$, *a fortiori* $p_1[\theta_1(\alpha_j^{(o)})]$ and $p_2[\theta_2(\alpha_j^{(o)})]$ cannot be both true. So:

A logical conjunction of $p[\theta_1(\alpha_j^{(o)})]$ and $p[\theta_2(\alpha_j^{(o)})]$ is *devoid of factual counterpart*. It cannot be defined, which is a case different from that in which it can be defined but comes out to be false.

A logical conjunction of $p[\theta_1(\alpha_j^{(o)})]$ and $p[\theta_2(\alpha_j^{(o)})]$ is *devoid of factual counterpart*. It cannot be defined, which is a case different from that in which it can be defined but comes out to be false.

This can be better understood by the help of truth-tables: Given two propositions p and q , their logical product $p \wedge q$ is defined by:

p	q	$p \wedge q$
T	T	T
T	F	F
F	T	F
F	F	F

What happens if $p \equiv p_1[\theta_1(\alpha_j^{(o)})]$ and $q \equiv p_2[\theta_2(\alpha_j^{(o)})]$? In this case the top line "TTT" represents a combination which, factually, is *systematically impossible*. The factually possible cases are only

p	q	$p \wedge q$
T	F	F
F	T	F
F	F	F

But what this last set of possibilities claims, is that the logical product $p \wedge q$ simply does not "exist", factually, since it **never** is factually truee ²⁰.

It claims this in the amputating "purely syntactical" language of classical logic. But what is thus claimed is not a purely syntactical matter, it is a matter of syntax which directly expresses a matter of *fact*. If $p = p_1[\theta_1(\alpha_j^{(0)})]$ and $q = p_2[\theta_2(\alpha_j^{(0)})]$, the logical product $p \wedge q$ considered above is meaningless with respect to the value "true" of *any* aspect g of any constructible view of empirical truth with respect to which both p or/and q do exist in the sense of D7. This is so in consequence, not of the falsity of either p or q considered separately, but in consequence of the fact **prior** to such a falsity, that the realizability of the testimony $\theta_1(\alpha_j^{(0)})$ is incompatible with that of the testimony $\theta_2(\alpha_j^{(0)})$, so that p and q *cannot coexist*. To represent this new sort of situation by still saying in an inertial and non specific way that $p \wedge q$ is "false" – exactly as we say in the cases when p and q *can* coexist but one of them is false –, amounts to a too loose formalization-and-language which by construction is unable to express the specificities of a whole definite category of cases. Obviously the aim of maximal formal "generality" cannot justify such a categorial non-specificity. In a well-adjusted logical formalization the situation from the last table requires an own syntactical sign that shall prevent void writings of logical products $p \wedge q$ that are *a priori* impossible factually.

This is the usually so fuzzily understood core of what is called "quantum logic", reflected there in such a truncated and distorting fashion ²¹.

But as soon as two or more replicas of a given object-entity are allowed (so *a fortiori* if also two or more sorts of object-entities are allowed) the mutual exclusions founded on the unicity of the involved replica of object-entity vanish, and a factual counterpart can be defined for the logical conjunction of *any* two successions $[G^{(0)}, V^{(0)}]$, *even if they correspond to mutually incompatible basic views*. Then, however, one finds oneself already in the realm of statistics, and there, *grosso modo*, the "Boolean" logic, so the algebras from the classical probability spaces, *do* operate (cf. note 44).

The assertion of a non restricted possibility of logical conjunction *presupposes* *statisticity*. The classical Boolean logic is quasi systematically statistical. It overlooks the specificities of strict individuality.

By its "universals" (at least) classical logic usually begins above the level of strict individuality and then keeps floating over it, loose and dead, cut away from its unknown roots implanted in strict factual individuality. While **only** a level of logical conceptualization where strict individuality is explicitly characterized can contain a common foundation for classical logic and classical probabilities (cf. V2).

For the particular case of quantum mechanics (ref. 16) I have already introduced a logical conjunction restricted by a syntactical sign of factual mutual exclusion between two propositions reflecting *exclusively* the unicity of the involved replica of object-entity. This permits to deal with the question of quantum logic in a much deeper way than the

²⁰ Wittgenstein (*Remarks on Logical Form*, Aristotelian Society, 1929) made an analogous analysis related with another sort of factual mutual space-time exclusion:

«I have said elsewhere that a proposition "reaches up to reality", and by this I meant that the forms of the entities are contained in the form of the proposition which is about these entities. For the sentence, together with the mode of projection which projects reality into the sentence, determines the logical form of the entities.....For if the proposition contains the form of an entity which it is about, then it is possible that two propositions should collide in this very form. The propositions "Brown now sits in this chair" and "Jones now sits in this chair" each, in a sense, try to set their subject term on the chair. But the logical product of these propositions will put them both there at once, and this leads to a collision, a mutual exclusion of these terms.....It is, of course, a deficiency of our notation that it does not prevent the formation of such nonsensical constructions, and a perfect notation will have to exclude such structures by definite rules of syntax. These will have to tell us that in the case of certain kinds of atomic propositions described in terms of definite symbolic features certain combinations of the T's and F's must be left out (T: true; F: false). Such rules, however, cannot be laid down until we have actually reached the ultimate analysis of the phenomena in question. This, as we all know, has not yet been achieved».

Wittgenstein's propositions "Brown now sits in this chair" and "Jones now sits in this chair" are related with a *dual* space-time mutual exclusion (two distinct sorts of object-entities are involved, not only one) and furthermore a space-time mutual exclusion that can happen or *not* (if in the second proposition, instead of Jones, we set "Brown's bacterian flora" there is no exclusion any more). Therefore this kind of dual space-time mutual exclusion cannot be expressed by a *principle* like P10. But it is very striking indeed that – without benefiting of guidance by quantum mechanics, which in the present work led toward "the ultimate analysis of the phenomena in question" – Wittgenstein has identified as early as 1929 the decisive *individualizing* role played by space-time in the factual mutual exclusions of two propositions (he labels propositions like those considered above by the group of letters PT where P means place and T means time). It is also striking that, notwithstanding Wittgenstein's work quoted above, the illusory belief of independence of syntax, on semantics, still is so strong, up to this very day.

²¹ In quantum mechanics the distinction between the individual level of description and the statistical one is not sufficiently clear, so the ways of speaking often seem to involve that qualifications by two mutually incompatible observables are *always* mutually exclusive, while qualifications by two compatible observables are never mutually exclusive: the decisive, the **exclusive** role of the restriction, or not, to only *one replica* of the involved object-entity $\alpha_j^{(0)}$, is not recognized.

usual one. Now, the mentioned approach can be individualized to any two testimonial propositions $\theta_1(\alpha_j^{(0)})$ and $\theta_2(\alpha_j^{(0)})$. When this is done it becomes possible to effectively construct an MRC-calculus with testimonial propositions which connects the level of strict factual individuality, with the statistical level of logic, *via* a very first stratum of logical form where the conjunction is not universally permitted.

Like the relativization to semantic features of the syntactical logical void, the dependence of the domain of pertinence of the logical conjunction, on semantic features (the mutual incompatibility of two testimonial propositions $\theta_1(\alpha_j^{(0)})$ and $\theta_2(\alpha_j^{(0)})$ and so the mutual factual exclusion of the corresponding propositions $p_1[\theta_1(\alpha_j^{(0)})]$ and $p_2[\theta_2(\alpha_j^{(0)})]$), illustrates again how factuality, semantics, can determine logical form.

The MRC-status of the "objects" of the classical logic of classes and predicates

Inside the general category of genetic classes, the classical concept of class is re-obtained in only the following two cases.

(a). A basic genetic class of the type $C[G^{(0)}(V^{(0)}), V^{(0)}]$ is involved, where $V^{(0)}$ denotes a human biological sensorial view. In this case the generator $G^{(0)}(V^{(0)})$ – i.e. $V^{(0)}$ itself but in the *role* of generator of object-entity –, even though it is basic, is not explicitly perceived to create out of the physical reality the corresponding object-entity, namely the field of sensitivity of $V^{(0)}$; while the basic view $V^{(0)}$, again the view involved in the description but which now also plays the *role* of a view, can be assumed without inner contradiction to qualify the created object-entity without changing it. This particular sort of basic transferred description produces a very simplified sort of basic description $D^{(0)}$ that can be, and indeed is, spontaneously metaconceptualized intrinsically, by an implicit process; and then is furthermore immediately reduced implicitly to the corresponding intrinsic model $M(\alpha^{(0)})/[V^{(0)}, V_1^{(1)}]$, where the relativities to the basic view $V^{(0)}$ and to the intrinsizing view $V_1^{(1)}$ remain hidden, only the model $M(\alpha^{(0)})$ itself is perceived, and so it is taken to be absolute. This model is what is illusively felt to somehow exist eternally and immutably, independently of any observer, in an abstract Platonian space where it stays available for passive perceptions of [truth's of P's] (cf. D19.1, and D19.2 with their comments, and V.1.1). This – the models $M(\alpha^{(0)})$ cut from their relativizing ties with the basic transferred descriptions wherefrom they stem – is the basis of the Platonian realism (in the scholastic sense), which down to the present day grasps the minds with irresistible force. The logicians and mathematicians are particularly exposed to this force because they have found methods to distil consistent systems of very abstract models $M(\alpha^{(0)})$ which are so perfect that *a posteriori* they seem to be endowed with divine pre-existence and supreme intelligibility.

(b). A basic genetic class of the type $C[G^{(0)}(V^{(0)}), V^{(0)}]$ is involved where $V^{(0)}$ denotes *extensions* by apparatuses of the domain of human biological sensorial aspect-views. All the preceding remarks are valid for this case also. The intrinsic models elaborated in this somewhat enlarged framework belong to the realm of exact classical sciences (think of what is called atomic spectra, and the corresponding intrinsic models of atoms) to most of which the classical logic still applies.

In both cases mentioned above the *content* of the epistemic operator playing the *role* G, identifies with the content of the view V which plays the role of a view, and furthermore this view V is reduced to an undefined and structureless abstract "predicate P". So $G \equiv V \equiv P$, all the involved descriptional actors being identified to P. This point-like degeneration is what entails the loss of awareness of the ineluctable action, in any description and so in any proposition, of also a generator G of object-entity. Correlatively the "direction of conceptualization" defined by a double-extremity genetic class $C[G.V]$, gets lost also. The classical definition of a class determined by (the truth of) exclusively a predicate P is just tangential to the superficial level of the already verbalized-conceptualized intrinsic models represented by "object-variables x", a definition which is loose like the needle of a compass.

So we have recovered here in analyzed terms a conclusion already asserted in the preliminary critical comments from V.1.1 :

Inside MRC the domain of "objects" directly considered in the classical logic is found to consist of exclusively intrinsic models $M(\alpha^{(0)})/[V^{(0)}, V_1^{(1)}]$, always conceptual constructs extracted from spontaneously achieved implicit intrinsic metaconceptualizations of degenerate transferred descriptions $D^{(0)}$ produced by successions of the particular type $[G^{(0)}(V^{(0)}), V^{(0)}]$ where the human biological apparatuses cumulate the roles of generator of object-entity and the role of view.

These "objects" never disclose the fragments of as yet non conceptualized physical factuality from their cores, wherefrom any conceptualization stems *via* basic transferred descriptions. The connection between an intrinsic model $M(\alpha^{(0)})/[V^{(0)}, V_1^{(1)}]$ and the corresponding basic description $D^{(0)}/G^{(0)}, \alpha^{(0)}_{G}, V^{(0)}/$ remain ignored because both the basic view $V^{(0)}$ and the intrinsizing metaview $V_1^{(1)}$ are wired into the morphology and the reflex functioning of our bodies, so the relativities to this pair of views $(V^{(0)}, V_1^{(1)})$ remain hidden to the immediate natural perception of the human mind. The neurobiologists and the cognitivists are now studying them intensively from a psycho-biological standpoint. But among the sciences of non-biological domains of the physical reality, only quantum mechanics has

succeeded to get down to these cores of a-conceptual physical factuality hidden inside the classical models, and it has *represented* their extraction as well as their very first transposition in communicable terms, by basic transferred descriptions. It has represented all this indeed, but *only cryptically*, mathematically from the start on, and without being able to formulate their descriptive status, nor to accomplish also the subsequent descriptive phase of intrinsic metaconceptualization. The integral conceptual trajectory that leads from the basic transferred descriptions to classical models $M(\alpha^{(0)})$, remained hidden to quantum mechanics also, and in consequence of this the universal significance of quantum mechanics itself remained hidden. So the possibility – always – of at least a minimal intrinsic model in the sense of D19.3, has not been pointed out, and the *universal* rooting of any model, in physical factuality, remained non perceived. And now, when eventually all this becomes apparent and so a general law of growth of the processes of conceptualization is brought forth, it will be tried for some time, no doubt, to ignore or even to deny it, because a positivistic philosophy has had time to constitute and to consolidate itself, and so now it opposes its own inertial resistance.

In sum, in classical logic we circulate swiftly on an aerial net of smooth highways for deduction, erected out of models drawn from a thick stratum of unsuspected hidden conceptualization that keeps us far from the ground of as yet non-conceptualized physical reality. The MRC genetic logical approach explicates the presence of this stratum and its whole morpho-functional structure into which the classical models $M(\alpha^{(0)})$ are fixed by innumerable genetic threads. This offers now this stratum, as well as the models, to control and deliberate use.

V.1.3. Conclusion on the MRC-logic

It is remarkable that MRC, such as it has been constructed by taking initial support exclusively on quantum mechanics, leads to the outline of a logical approach that is relevant not only for the basic, the physical creative genetic classes $C[G^{(0)},V^{(0)}]$ of the type of those involved in quantum mechanics, but also for *conceptual* creative genetic classes $C[G.V]$ found to be involved in formal systems.

The quantum mechanical cognitive strategy, individualized inside MRC, has opened up a way of conceptualization that is not mute with respect to the most fundamental questions of nowadays abstract mathematical and logical thinking.

This is so because the canonical descriptive mould (G, α_G, V) drawn from quantum mechanics has been constructed at the lowest level of conceptualization which human mind has been able to reach, possibly the final one. There the most severe conditions that can be encountered in a process of conceptualization, are all active. So a basic structure of labelled receptacles for conceptualization which is constructed to fit these conditions, is sufficiently comprehensive for harbouring any descriptive possibility that might occur. Inside this structure, semantics and cognitive actions – which always involve *aims* – combine with the syntactic features, and this induces both intelligibility and control.

V.2. MRC versus Probabilities

One of the major successes of MRC is the representation of a deeper general concept of probability, which contains and explains the so cryptic quantum mechanical probabilities (refs. 15-18). Indeed, when Kolmogorov's classical concept of a probability space is examined inside MRC, the limitations and the absolutizations which flaw this concept come into striking evidence. By suppressing them, the concept of probability expands to the limits of its whole natural volume which rests on the most basic level of transferred conceptualization and extends up to very high descriptive levels.

Throughout the process of construction of the MRC-concept of probability, the methodological principle of separation P15 plays a key role. Therefore this process can also be regarded as a succession of illustrations of the very peculiar way in which the principle of separation works.

V.2.1. Komogorov's Classical Definition of a Probability Space

The fundamental concept of the nowadays theory of probabilities - in Kolmogorov's formulation ²² - is a probability space $[U, \tau, p(\tau)]$: $U = \{e_i\}$ (with $i \in I$ and I an index set) is a *universe of elementary events* e_i (a set) generated by the repetition of an "identically" reproducible *procedure* P (called also an experiment) which, notwithstanding the posited identity between all its realizations, nevertheless brings forth elementary events e_i that *vary* in general from one realization of P to another one; τ is an *algebra of events* built on U ²³, an event, let us denote it e , being a subset of U and being posited to have occurred each time that any elementary event e_i from e has occurred; $p(\tau)$ is a *probability measure*

²² Kolmogorov, A.N., (1950) *Foundations of the Theory of Probabilities*, Chelsea Publishing Company (translation of the original German monography (1933) *Grundbegriffe der Wahrscheinlichkeitrechnung*, Ergebnisse der Mathematik.

²³ An algebra built on a set S is a set of subsets of S – S itself and \emptyset being always included – which is such that if it contains the subsets A and B , then it also contains $A \cup B$ and $A \cdot B$.

defined on the algebra of events τ ²⁴. A pair $[P,U]$ containing an identically reproducible procedure P and the corresponding universe of elementary events U is called a *random phenomenon*.

On a given universe U , one can define various algebras τ of events. So it is possible to form different associations $[[\text{random phenomenon}], [\text{a corresponding probability space}]]$, all stemming from the same pair $[P,U]$.

With respect to the previous representations (Bernoulli, von Mises, etc.) – where only a concept of "probability law" (or "probability measure") was defined mathematically – Kolmogorov's concept of a probability *space* $[U, \tau, p(\tau)]$ has marked a huge complexifying progress.

V.2.2. Critical remarks

In Kolmogorov's classical theory of probabilities, the procedure P is neither formally defined, nor symbolized or otherwise represented. This theory contains no symbolic location reserved for the procedure P , so *a fortiori* the random phenomena $[P,U]$ as a whole is not represented. The consequence is that the structure of the connection between the considered probability space $[U, \tau, p(\tau)]$, with the substratum wherefrom it is generated, is very rarely explicitly surveyed. Usually nothing whatever is asserted concerning the way in which the elementary events from the universe U do emerge by the procedure P .

The channel for the adduction of semantic substance from the "pool of reality" (in the sense of D2) into the considered probability space $[U, \tau, p(\tau)]$, is undefined and unexplored. It is only alluded to by mere words.

In each application of the abstract theory of probabilities, to some specific problem, the corresponding semantic substance is injected into the studied probability spaces in an intuitive unruly way. It might be argued that this is an intentional non-determination which endows the formalism with a maximal generality (interpretability). However the absence of any formal mould for the expression of a probabilistic concept as basic as the random phenomenon that generates the considered probability space, cannot be claimed to maximise the generality of the formalization. It clearly is just a lacuna.

Furthermore, from the standpoint of MRC the definitions of the elements from the probability space $[U, \tau, p(\tau)]$ are lacking precision. For instance:

- What is the descriptive status of the procedure P ? Is it an operation of generation of an object-entity? Is it an operation which only somehow involves an already previously generated object-entity? Or is it some *association* between an operation of creation or of only manipulation of a pre-existing object-entity, and an operation of examination of the result, by some view? It seems obvious that also some view is acting inside the procedure P , since it is asserted that, notwithstanding the "identity" between all its realizations, the procedure brings forth "different" elementary events e_i . But "different" in what a sense? With respect to which view? In the absence of *any* view the elementary events cannot be perceived. They even cannot be imagined. So *a fortiori* they cannot be compared and mutually distinguished. So the content of the procedure P is obscure; it has to be elucidated.

- Furthermore, supposing now that indeed a view is found to be involved in what is called an elementary event, the unique index i for distinguishing between the elementary events e_i is not sufficient for cutting out a conceptual receptacle able to contain the full specification of the qualifications produced by this view. Even in the simplest case of a view with only one aspect, the definition D5.1 requires already two indexes, an aspect-index g and an index k of value of this aspect. The symbolic framework necessary for the expressibility of the qualifications of an object-entity, *via* the MRC concept of a view, is absent from Kolmogorov's representation. *The Kolmogorov concept of elementary event cannot be clearly referred to MRC-views; it even cannot be clearly referred to classical predicates.* The involved "properties" or "specificities" are just alluded to, but neither their logical status (or even only the grammatical or the descriptive one), nor their contents, are defined. Thereby *it is an a-logical concept.*

- This circumstance becomes clearer by its consequences upon the events e from the algebra τ constructed on the universe U of elementary events. An event e is by definition "a subset of elementary events from the universe U ". But – in general – this subset is not regarded as a class determined by some predicate. So it cannot be directly connected with syllogisms which are essentially tied to classes of predicates (all the men are mortal; Socrate is a man; so Socrate is mortal). This is one of the main reasons why classical probabilities withstand the attempts at the specification of a general relation with classical logic: the elementary events and the events are introduced in set-theoretical counting terms, not in classical grammatical-logical terms (subject-predicate).

- But the most fundamental question is this. Beyond its formal definition, what is the significance of the probability measure from a probability space? The semantic involved in the concept of probability measure remains very particularly cryptic. A remarkably complete study on this topic has been made by Fine²⁵ in 1973, and Karl Popper has made on this subject deep considerations that will be mentioned below²⁶.

²⁴ A probability measure defined on τ consists of a set of real numbers $p(A)$, each one associated to an event A from τ , such that: $0 \leq p(A) \leq 1$, $p(U)=1$ (normation), $p(\emptyset)=0$, and $p(A \cup B) \leq p(A) + p(B)$ where the equality obtains iff A and B are "independent" in the sense of probabilities i.e. iff they have no elementary event e_i in common ($A \cap B = \emptyset$). The number $p(A)$ yields the value of the limit – supposed to exist – toward which the relative frequency $n(A)/N$ converges when the number N of realizations of the involved repeatable procedure P is increased toward infinity ($n(A)$ being the number of outcomes of A when P is repeated N times).

²⁵ Fine, T. L., (1973), *Theories of Probability*, Acad. Press. I do not think that meanwhile the situation has much evolved.

²⁶ Popper, K., *Quantum Mechanics without the Observer*, in *Quantum Theory and Reality*, Mario Bunge ed., (1967), Springer Verlag; *A World of Propensities*, (1990) Thoemmes.

V.2.3. MRC-Reconstruction of the Concept of Probability

Generalities

In what follows we shall proceed under two conjugated sets of constraints: Kolmogorov's concept of a probability space, and the requirements of MRC.

Each *association* between a given random phenomenon $[P,U]$ and a probability space $[U,\tau,p(\tau)]$ generated by it will be called a *probability chain* and will be symbolized by the writing

$$[P,U] \rightsquigarrow [U,\tau,p(\tau)]$$

where the sign \rightsquigarrow represents a connection of which the content and the structure have to be specified. According to the principle of separation P15 and the definition D16 of a metadescription, a probability chain involves explicitly a hierarchy of three connected but distinct descriptive levels. Indeed:

- *the elementary events e_i are placed on a first descriptive level;
- * the algebra τ of events is placed on a higher descriptive level, since it involves sets e of elementary events e_i from U ;
- * the probability measure $p(\tau)$ lies on a still higher descriptive level than τ since it qualifies numerically the relative frequencies $n(e)/N$ of the outcomes of the events e from the algebra of events τ .

And – again according to the principle of separation P15 – the process of description achieved on *each* one of these three distinct levels involves its *own* epistemic referential, which has to be specified. So, by confrontation with a Kolmogorov probability space, it appears now strikingly to what a degree the provisional definition of a probabilistic relative description contained in D14.1 (cf. note 27) ²⁷ was insufficient, and even from the point of view of MRC itself. When this provisional definition has been introduced, the principle of separation and the concept of relative metadescription were not yet defined, nor the concept of a genetic class, and the Kolmogorov concept of a probability space had not yet been introduced as a reference. But in the present stage of development of MRC it is obvious that *the initial epistemic referential (G,V) considered in D14.1, certainly cannot produce all the qualifications required by a probabilistic description able to include the whole – very complex – concept of probability introduced by Kolmogorov*. Other metareferentials certainly have to be brought in.

The following thorough elaboration of the content of a probability chain will suppress the initial lacunae. The results will permit to understand in a more concrete way the powers of systematic descriptivizations.

We shall proceed in three stages. In a first stage we shall develop the MRC concept of probability tree of a basic epistemic referential, inside which a unification between relativized logic and relativized probabilities will find place. In a second stage, by intrinsic metaconceptualization, we shall obtain a minimal space-time model for the random phenomenon which constitutes the physical ground of the probability tree of a basic epistemic referential; this model introduces a new sort of set called a genetic set (genset), that opens up the way toward a genetic relativized set-theory. In a last third stage we shall specify the MRC significance of a probability measure.

First stage. Probability tree of a basic epistemic referential

Elementary event from a basic probability chain. Consider a probabilistic description of a physical object-entity which moreover is a *basic* transferred description $D^{(o)}/G^{(o)},\alpha^{(o)},V^{(o)}$ ²⁸. The corresponding epistemic referential is

²⁷ We recall the definition of a *probabilistic relative description of a physical object-entity* contained in D14.1: Consider an epistemic referential (G,V) where G is a *physical* generator that generates a corresponding *physical* object-entity α_G , and V is a *physical* view with respect to all the aspect-views V_g of which α_G does exist in the sense of D7 and which – as required by P8 and C9 – contains a space-time view V_{ET} introducing an *ordered* space-time grating (D5.4). Furthermore consider, for *each* V_g from V , a big number N of realizations of the corresponding sequence $[G,V_g]$ – in simultaneity or in succession – the time parameter being set or re-set at the same initial value t_0 for each realization of a sequence $[G,V_g]$,.... Suppose now that, when the various successions $[G,V_g]$ with $V_g \in V$ are realized N times, *not* all the successions $[G,V_g]$ are found to reproduce identically one same configuration of $gk-Er-Tt$ -values; that at least for one $V_g \in V$ (not necessarily for all) the corresponding succession $[G,V_g]$ produces a whole set $S_{g_i} = \{c_{g_i}\}$ of mutually distinct, dispersed configurations c_{g_i} of $gk-Er-Tt$ -values, (with $i \in I$ and I a finite index-set, to preserve the finitistic character of this approach); but that, for *any* succession $[G,V_g]$ which produces dispersed results, when N is increased toward infinity, the relative frequency $n(c_{g_i})/N$ of occurrence of *each* configuration $c_{g_i} \in S_{g_i}$ converges toward a corresponding probability p_{g_i} . In these conditions each configuration $c_{g_i} \in S_{g_i}$ will be called an *elementary-event-description* corresponding to the succession $[G,V_g]$ with $V_g \in V$ and it will be denoted $D_{p(g_i)}/G,\alpha_G,V_g/$. The epistemic referential (G,V) will be said to produce a *probabilistic relative description* of the physical object-entity α_G , which will be denoted $D_p/G,\alpha_G,V/$.

So in D14.1 the concept of probability space was not explicated. For the algebra of events τ there is not even an implicit equivalent, while the distinction between the descriptive level where the elementary events are placed, and the level where the probability measure can be placed, remains obscure.

²⁸ We recall also the definition D14.1.3 of a *basic transferred relative description*: – The generator consists of a physical operation and it produces a physical object-entity that cannot be perceived directly by man. 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 will be denoted $\alpha^{(o)}$. – The view able to draw 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 (by coding rules) from features of a material device for gk -registrations – biological, or not – but which always is *different from the studied object-entity*, these features emerging in consequence of interactions between the examination-and-registering-device and replicas of the considered basic object-entity. A view of the just specified kind will be called a *basic transfer-view* (in

$(G^{(o)}, V^{(o)})$. One observable mark contributing to $D^{(o)}/G^{(o)}, \alpha^{(o)}, V^{(o)}$ is produced by one realization of a succession $[G^{(o)}, V_g^{(o)}]$ with $V_g^{(o)} \in V^{(o)}$, and obviously *it has here the probabilistic status of what is called an elementary event*: when a succession $[G^{(o)}, V_g^{(o)}]$ is repeated a big number of times, a whole dispersed set $\{gk, k=1, 2, \dots, K\}$ (a universe) of values gk of $V_g^{(o)}$ is obtained (K a finite index set).

Let us concentrate upon the fact that in general the global view $V^{(o)}$ contains several aspect-views $V_g^{(o)} \in V^{(o)}$ that are not all mutually compatible in the sense of P10. So, in general, $V^{(o)}$ splits in a finite number n of subsets $b=1, 2, \dots, n$ which we shall call genetic *branches* (the reason of this denomination will become clear later), such that inside one given branch the aspect-views are all mutually compatible, while two aspect-views from two different genetic branches are mutually incompatible (in the sense of the principle P10 of individualizing mutual exclusion).

Consider then one given branch b . The preceding remarks show that it is convenient to re-note by $V_{bj}^{(o)}$, $j=1, 2, \dots, m$, $m \leq n$, the m mutually compatible basic aspect-views $V_g^{(o)} \in V^{(o)}$ that belong to this same branch b . We can then write $V_b^{(o)} \equiv \bigcup_j V_{bj}^{(o)}$ where $V_b^{(o)}$ is a global notation for the view that acts in b . How does the branch-view $V_b^{(o)}$ work? The definition of “incompatible”/“compatible” physical aspect-views introduced in P10 entails that *the aspect-views $V_{bj}^{(o)}$, $j=1, 2, \dots, m$ from one same branch differ from one another **only conceptually***, in the following sense: they always can be all measured simultaneously on *one* replica of the considered basic object-entity $\alpha^{(o)}$, by making use of a conveniently conceived common measurement-and-registering device. Let us call such a device a *branch-device*, in short a b -device. One act of examination by this unique b -device yields *one* factual result consisting of only one configuration of observable marks, say bk , where b labels the branch and k the configuration (so $k \in K$ where K is an index set of which the cardinal is equal to the number of all the possible distinct configurations bk). But from the unique factual configuration bk considered above, one can afterward derive, by further *abstract* manipulations, m distinct conceptual interpretations of bk . Indeed the definition D5.1 introduces, for each given aspect-view $V_{bj}^{(o)}$, its *own* rules for coding in terms of aspect-values of *that* $V_{bj}^{(o)}$, the unique result bk produced by one $V_b^{(o)}$ -examination: each $V_{bj}^{(o)}$ yields its own “interpretation” of the registered configuration of marks bk . In short, each realization of a succession $[G^{(o)}, V_b^{(o)}]$ produces one configuration bk of factual marks which is then m -fold qualified in the m different aspect-values-languages introduced by $V_b^{(o)} \equiv \bigcup_j V_{bj}^{(o)}$ 29.

This m -fold qualification of one configuration bk of factual marks can be regarded as a certain individual relative description in the sense of D14.1. Namely a *relative description* $D/G', bk, V_{bc}^{(o)}$ of the configuration of marks bk selected as object-entity by a corresponding conceptual generator G' , and then qualified *via* the coding-view extracted from $V_b^{(o)}$, i.e. the view, say $V_{bc}^{(o)}$, of which the aspects consist of the m different coding-rules, say c_j , $j=1, 2, \dots, m$, introduced by the theoretical definitions of the m compatible aspects $V_{bj}^{(o)}$. This “didactic” descriptiveness is possible because a transferred mark bk , once it has been registered, can be kept indefinitely on the b -device and re-interpreted accordingly to the “coding-view” $V_{bc}^{(o)}$ as many times as desired: the result will always stay the same, so there will be individual stability of the qualification of bk .

But the result of one realization of a succession $[G^{(o)}, V_b^{(o)}]$ can also be regarded otherwise, namely as a *relative testimony* in the sense of D14.2.2. Indeed one succession $[G^{(o)}, V_b^{(o)}]$, each time that it is globally repeated – the basic,

short a basic view) and will be denoted $V^{(o)}$. The aspect-views from $V^{(o)}$ will be called basic aspect-views and will be denoted $V_g^{(o)}$. - The epistemic referential $(G^{(o)}, V^{(o)})$ will be called a *basic epistemic referential*. - A relative description in the sense of D14.1 - individual or probabilistic - achieved with a basic generator and *one* basic transfer-aspect-view $V_g^{(o)}$, will be called a *basic transferred relative aspect-description* and it will be denoted $D^{(o)}/G^{(o)}, \alpha^{(o)}, V_g^{(o)}$. - A relative description in the sense of D14.1 - individual or probabilistic - achieved with a basic generator $G^{(o)}$ and a basic transfer-view $V^{(o)}$ involving at least two *mutually incompatible* basic aspect-views $V_{g1}^{(o)}$ and $V_{g2}^{(o)}$, will be called a *basic transferred relative description* (also - in short - a basic description or a transferred description) and it will be denoted $D^{(o)}/G^{(o)}, \alpha^{(o)}, V^{(o)}$ (in short $D^{(o)}$). - A basic transferred description $D^{(o)}/G^{(o)}, \alpha^{(o)}, V^{(o)}$ is posited to *characterize* observationally the involved object-entity $\alpha^{(o)}$, which means that it is posited that no other operation of generation $(G^{(o)}) \neq G^{(o)}$ can be found which, associated with the same basic view $V^{(o)}$, shall produce the same basic transferred description.

29 We take an example from quantum mechanics. The momentum observable \mathbf{P} and the observable $p^2/2m = T$ of kinetic energy, are compatible. So they can be measured by a same branch-device (by a method called “time of flight”). This device involves a screen. An examination of one replica of the studied microstate yields two data, namely a mark on this screen and the time when the mark occurred, which constitutes a bk -configuration of two factual “marks”. From this unique bk -configuration, one then calculates by rules specified in advance, on the one hand the vector-*eigenvalue* of the observable \mathbf{P} , and on the other hand the scalar *eigenvalue* of the observable T . Each one of these two calculations “describes” the unique bk -configuration of factual marks, in terms of eigenvalues of one of the involved compatible observables. Together, these two descriptions constitute an elementary-event-description $ee_{b1}^{(o)}$.

physical $V_b^{(o)}$ -examination included, not only the coding-examination of a previously obtained mark bk which then is kept available on the b -device –, produces a unique transferred result bk endowed with a unique global coding in terms of all the m -aspect-coding-view V_{bc} defined above (that is why the description $D/G',bk,V_{bc}/$ defined above is individual). And in so far that one decides to stay fixed on the level of the individual qualifications (not to pass on higher levels to research statistical and probabilistic distributions), the unique mark bk with its unique global coding manifests the status of just a relative testimony $\theta^{(o)}(G^{(o)},\alpha^{(o)},V_b^{(o)})$ concerning a qualification *via* the branch-view $V_b^{(o)} \equiv \cup_j V_{bj}^{(o)}$ (codings included), of the basic object-entity $\alpha^{(o)}$ produced by the basic generator $G^{(o)}$. Indeed if the succession $[G^{(o)},V_b^{(o)}]$ is entirely repeated, in general another mark bk will be obtained: no descriptonal stability will be found. But a relative testimony still is a (limiting) form of relative description, since it contains an object-entity produced by a corresponding generator and a view which qualifies this object-entity. So, in *any* case:

According to MRC each elementary event produced by a basic succession $[G^{(o)},V_b^{(o)}]$ has the descriptonal status of a *relative description*. So it involves a view (in classical terminology, predicates) which permits classifications³⁰. This will appear just below to be crucial for the unification of the probabilistic approach, with the logical one.

Let us denote such an elementary event by

$$ee_{bi}^{(o)} \equiv \theta^{(o)}(G^{(o)},\alpha^{(o)},V_b^{(o)}) \text{ or } ee_{bi}^{(o)} \equiv D/G',bk,V_{bc}/$$

where the index i belongs to a (finite) index-set I and labels globally the m -fold qualification of the unique mark bk that has emerged by the one considered basic examination $V_b^{(o)}$. Thereby the question of the MRC-status of a basic elementary event is settled.

The random phenomenon from a basic probability chain. By hypothesis, when a given succession $[G^{(o)},V_b^{(o)}]$ is repeated a big number of times, the obtained factual results bk are dispersed. Then also the corresponding elementary events are dispersed: a whole branch-universe $U_b^{(o)}$ is produced by the repetitions. So to each branch-view $V_b^{(o)}$ from $V^{(o)}$ there corresponds a *branch-random phenomenon* that can be written as

$$[[G^{(o)},V_b^{(o)}], U_b^{(o)}]$$

By identification of terms with the generic expression $[P,U]$, it appears that in this case *the repeatable procedure P consists of the succession of epistemic operations $[G^{(o)},V_b^{(o)}]$* . So we have:

$$P_b^{(o)} \equiv [G^{(o)},V_b^{(o)}], \quad U_b^{(o)} = \{ee_{bi}^{(o)}, i \in I\}, \quad [P_b^{(o)},U_b^{(o)}] = [[G^{(o)},V_b^{(o)}], U_b^{(o)}]$$

This settles also the questions of the MRC-status of a branch-procedure $P_b^{(o)}$ and of the content of a branch-random-phenomenon $[P_b^{(o)},U_b^{(o)}]$.

The meta[random-phenomenon] produced by a basic epistemic referential Consider now the whole basic epistemic referential $(G^{(o)},V^{(o)})$. It can be reconstructed additively as a union

$$(G^{(o)},V^{(o)}) = \cup_b (G^{(o)},V_b^{(o)}), \quad b=1,2,\dots,n$$

of n mutually incompatible basic *branch-referentials* $(G^{(o)},V_b^{(o)})$ containing all the same basic generator $G^{(o)}$ but different basic views. These, because they are mutually incompatible, produce together a universe of basic elementary events U which is the union of n distinct *branch-universes* of basic elementary events, $U_b^{(o)}$, $b=1,2,\dots,n$:

$$U^{(o)} = \cup_b U_b^{(o)} = \cup_b \{ee_{bi}^{(o)}, i \in I\}, \quad b=1,2,\dots,n$$

³⁰ This is a detailed reconstruction of the content of the notation $c_{gi} \in S_{gi}$ from the preliminary definition of a probabilistic relative description contained in D14.1 and quoted in the note 73.

So the global random phenomenon produced by a basic epistemic referential $(G^{(o)}, V^{(o)})$ admits of the following sequence of equivalent but increasingly analyzed MRC-representations:

$$[[G^{(o)}, V^{(o)}], U^{(o)}] = [[P^{(o)}, U^{(o)}] = \cup_b [P_b^{(o)}, U_b^{(o)}] = \cup_b [[G^{(o)}, V_b^{(o)}], U_b^{(o)}] = \cup_b [[G^{(o)}, V_b^{(o)}], \{ee_{bi}^{(o)}, i \in I\}]]$$

A basic referential $(G^{(o)}, V^{(o)})$ generates a meta[random phenomenon], a whole family of *related* random phenomena, involving all *one same operation of generation of a basic object-entity*, but a (finite) set of distinct mutually incompatible branches brought forth by the mutually incompatible branch-views $V_b^{(o)}$ from $V^{(o)}$.

If in particular $V^{(o)}$ consists of only one branch-view $V_b^{(o)}$, $b=1$, this family reduces to only one random phenomenon $[P_b^{(o)}, U_b^{(o)}] \equiv [[G^{(o)}, V_b^{(o)}], U_b^{(o)}]$ like in the classical Kolmogorov probabilities.

This, finally, is a complete, fully explicit and entirely relativized representation of the content of the random phenomena involved by a basic epistemic referential.

*The channels for the adduction of semantic substance, from the pool of what is called "physical reality", into a basic probabilistic description, are now entirely **represented**.*

At the same time the powers of representation of the initial basic epistemic referential $(G^{(o)}, V^{(o)})$ are now exhausted. This referential alone cannot produce the whole MRC equivalent of a Kolmogorov representation of a probabilistic description, nor only a probabilistic description in the more ancient sense, of von Mises, for instance. Indeed $(G^{(o)}, V^{(o)})$ does not contain the descriptonal resources necessary for representing the generation of the object-entities and of the qualifications involved by an algebra of events constructed on the universe of basic elementary events $U_b^{(o)}$ produced by $(G^{(o)}, V_b^{(o)})$, nor those, still more complex, involved by a probability measure on this algebra. All that the initial epistemic referential $(G^{(o)}, V^{(o)})$ can produce, in fact, is only the basic transferred descriptions $ee_{bi}^{(o)}$ from $U_b^{(o)}$, $b=1, 2, \dots, m$, so also, at the limit, the m universes $U_b^{(o)}$ themselves.

The algebra of events on a branch-universe U_b . In order to re-define in MRC terms the algebra of events from a Kolmogorov probability space constructed on $U_b^{(o)}$, the principle of separation P15 and the definition D16 of a metadescription require to pass now on a higher level of conceptualization (with respect to the initial one) and to form there a convenient new epistemic referential.

Consider first only *one* among the branch random phenomena that contribute to the meta[random phenomenon] $[[G^{(o)}, V^{(o)}], U^{(o)}]$. Consider the branch-universe $U_b^{(o)}$ from this branch-random-phenomenon. The relativized elementary events $ee_{bi}^{(o)}$ from $U_b^{(o)}$ have the MRC status of descriptions involving some definite branch-view $V_b^{(o)} \equiv \cup_j V_{bj}^{(o)}$. This entails the following consequences.

(a) The insertion into the representation of the MRC concept of *probability*, of the deep level of *logical* conceptualization brought forth in V.1.2, namely the level tied with strict individuality. Indeed we have shown that each occurrence of an elementary event $ee_{bi}^{(o)}$ can be regarded to possess the descriptonal status of a testimonial relative description in the sense of D14.2.2, involving a *given* replica $\alpha_j^{(o)}$ of the basic object-entity $\alpha^{(o)}$; then its tentative assertion is a testimonial proposition $p[\theta_1(\alpha_j^{(o)})]$ in the sense of DL.4. We are in conditions which, in essence, coincide with those which in V.1.2 have been found to restrict the applicability of the logical conjunction: two testimonial propositions $p[\theta_1(\alpha_j^{(o)})]$ and $p[\theta_2(\alpha_j^{(o)})]$ which assert two distinct occurrences of elementary events (descriptions), $ee_{b1}^{(o)} \equiv \theta_1(\alpha_j^{(o)})$ and $ee_{b'w}^{(o)} \equiv \theta_2(\alpha_j^{(o)})$ with $l \neq w$, but which are asserted for a *same* replica $\alpha_j^{(o)}$ of the basic object-entity $\alpha^{(o)}$, cannot be composed by a logical conjunction, such a composition is meaningless because the resulting composed proposition cannot exist factually.

This "explains logically" why in a Kolmogorov probability space no product is defined for two elementary events, and why, if these elementary events are reconsidered inside the algebra from that space, as one-element sets, it is pertinent with respect to the factual situation that their intersection is systematically void.

It is satisfactory that these "logical explanations" is made available *inside* the concept of probability which is constructed here. This is a first manifestation of the intimate relation which arises inside MRC between probabilities and logic.

(b) A second consequence of the fact that the elementary events $ee_{bi}^{(o)}$ have the status of relative descriptions, is the definability, on the branch-universe $U_b^{(o)} = \{ee_{bi}^{(o)}, i \in I\}$, of a *classifying* branch-algebra of events involving classes determined on $U_b^{(o)}$ by aspects and values of aspects from the acting branch-view $V_b^{(o)} = \bigcup_j V_{bj}^{(o)}, j=1,2,\dots,m$. We have already remarked that the Kolmogorov elementary events, introduced by a set-theoretic definition, do not directly offer themselves for classifications, so that classifications can be only super-imposed upon them by an added, entirely exterior descriptonal action. Whereas inside MRC the elementary events $ee_{bi}^{(o)}$, because they emerge as relative descriptions, *are* qualifications (predications, in classical terms), so they *incorporate* criteria for future classifications.

Let us take an example. Remember that each elementary event $ee_{bi}^{(o)}$ can be regarded as a description of the object-entity [one observable configuration of marks bk], *via* the coding-view V_{bc} extracted from $V_b^{(o)}$. Imagine now that the coding-view V_{bc} is such that a description $ee_{bi}^{(o)}$ produced by it consists of some spatial configuration of coloured forms. Suppose that we consider the maximal spatial dimension involved by each form, specified separately, as a characteristic feature of $ee_{bi}^{(o)}$. Then, considering the class of all the $ee_{bi}^{(o)}$ of which the maximal spatial dimension of a form from it, is less than 5 cm, amounts to making abstraction of any other specificity than this last one; while considering the class of all the red $ee_{bi}^{(o)}$ from $U_b^{(o)}$ amounts to making abstraction of any other specificity of an $ee_{bi}^{(o)}$ apart from being red; etc. So, by dropping this or that qualification involved by the coding view V_{bc} involved by $V_b^{(o)}$, one can define *classes* on $U_b^{(o)} = \{ee_{bi}^{(o)}\}$, “classifying” metadescriptions of sets of elementary events from $U_b^{(o)}$. In this way it is possible to define on $U_b^{(o)}$ algebras τ_b of classifying metadescriptions of sets of elementary events $ee_{bi}^{(o)}$, *via* metaviews extracted from the coding view V_{bc} involved by $V_b^{(o)}$. An algebra of such metadescriptions will be called a *classifying algebra*. When a classifying algebra on $U_b^{(o)}$ is posited to contain also all the elementary events $ee_{bi}^{(o)}$ themselves, then it becomes the *total* classifying algebra on $U_b^{(o)}$ ³¹, which brings in, also, all the purely set-theoretic features of any set of basic elementary-event-descriptions $ee_{bi}^{(o)}$.

Now, syllogisms being constructed with classes of predicates, the classifying algebras defined on $U_b^{(o)}$ permit an immediate embeddability of syllogisms into them (continuing the example given above: all the descriptions $ee_{bi}^{(o)}$ which involve the qualification of being coloured red constitute the class $\{ee_{bi}^{(o)}\}_r$; the description $ee_{bq}^{(o)}$ belongs to the class $\{ee_{bi}^{(o)}\}_r$; hence the description $ee_{bq}^{(o)}$ involves the qualification red). So both levels of *logical* conceptualization become embeddable into the MRC concept of *probability*, not only the strictly individual level of logical conceptualization mentioned above – which so far remained entirely hidden outside MRC – but also the usual statistical level of natural logic.

Inside MRC, the relativization of any elementary event, to a definite view, entails complete dissolution of the obstacle that stands in the way of an explicit definition of the relations between the classical logic and the classical probabilities.

Together, the preceding points (a) and (b) indicate already in what a sense the MRC reconstruction of Kolmogorov’s concept of probability, entails a deep and organic, as if spontaneous association between the logical conceptualization and the probabilistic one. This however becomes still much clearer when instead of only the basic descriptions $ee_{bi}^{(o)}$ produced by the epistemic referential $(G^{(o)}, V^{(o)})$, the whole basic genetic class $C[G^{(o)}, V^{(o)}]$ is considered. Indeed in this case one becomes able to immediately conceive all the possible relations between the to-be-developed calculus with genetic classes indicated in V.1.2, and basic probabilistic descriptions.

Consider now explicitly the question of the epistemic referential involved by an event e from a classifying algebra τ_b defined on $U_b^{(o)}$. Such an event (if it does not coincide with an elementary event $ee_{bi}^{(o)}$) is a metadescription with respect to the descriptions $ee_{bi}^{(o)}$, produced by a new, conceptual, non basic metareferential. This metareferential introduces a metagenerator of object-entity which acts on the zone of reality consisting of the universe $U_b^{(o)} = \{ee_{bi}^{(o)}, i \in I\}$ and consists of just [the field of perceptibility of a metaview] extracted from the coding-view V_{bc} by some abstraction, by some dropping of values of aspects or of whole aspects from V_{bc} (consider the examples from the above point b). So it is the generator of a view. Let us denote it $G_{br}^{(1)}(V_{br}^{(1)})$ where $V_{br}^{(1)}$ is the view of abstraction that has been utilized; the lower index r labels the considered chosen classifying feature, while the upper index 1 stresses that we are now on a descriptonal metalevel with respect to that one labelled by 0 . The meta[object-entity] produced by this

³¹ The total algebra on a set S is the algebra on S (cf. note 69) which involves all the subsets of S , including the subsets of only one element from S .

metagenerator is a class $\{ee_{bi}^{(o)}\}_r$ of elementary descriptions from $U_b^{(o)}$. So the involved epistemic referential is $(G_{br}^{(1)}(V_{br}^{(1)}), V_{br}^{(1)})$. The corresponding relative (meta)description is

$$e_{br}^{(1)} \equiv D_{br}^{(1)} / (G_{br}^{(1)}(V_{br}^{(1)}), \{ee_{bi}^{(o)}\}_r, V_{br}^{(1)})$$

So the event $e_{br}^{(1)}$ from a classifying algebra $\tau_b^{(1)}$ defined on $U_b^{(o)}$ is a *degenerate* metadescription because it involves the generator of the acting view $V^{(1)}$, exactly like the implicitly achieved metadescriptions of which the “objects” from the classical logic consist (cf. V.1.2)). From now on τ_b is denoted $\tau_b^{(1)}$.

Since $e_{br}^{(1)}$ depends on the metaview $V_{br}^{(1)}$ which in its turn depends on the sort of abstraction by which it is extracted from the coding-view V_{bc} , another abstraction will lead to another metaview and another metagenerator, so to another event-description characterized by another lower index r .

The algebra of events $\tau_b^{(1)}$ introduces a whole family of metareferentials of the type $(G_{br}^{(1)}(V_{br}^{(1)}), V_{br}^{(1)})$.

The probability measure on a branch-algebra $\tau_b^{(1)}$. By definition the probability of an event $e_{br}^{(1)}$ from the algebra of events $\tau_b^{(1)}$ constructed on the universe of elementary events $U_b^{(o)}$, say $p(e_{br}^{(1)})=p_{br}$, is the limit – *supposed to exist* – toward which the relative frequency $n(e_{br}^{(1)})/N$ of the realizations of $e_{br}^{(1)}$ (of occurrences of any elementary event $e_{bi}^{(o)}$ from $e_{br}^{(1)}$) converges when N is increased toward infinity: $p_{br} = \lim_{N \rightarrow \infty} [n(e_{br}^{(1)})/N]$. And the probability measure on $\tau_b^{(1)}$ is by definition the set $\{p_{br}\}$ of all the probabilities assigned to events from $\tau_b^{(1)}$.

Let us specify the MRC descriptonal level of the probabilistic estimations from a branch-probability space. On a level immediately successive to that of $\tau_b^{(1)}$ – so here the level 2 with respect to the initial level 0 –, a convenient operational-conceptual generator of object-entity generates for each event $e_{br}^{(1)}$ from $\tau_b^{(1)}$ the corresponding relative frequency $[n(e_{br}^{(1)})/N]$ of occurrence of $e_{br}^{(1)}$ in a sequence of N iterations of the considered branch-random-phenomenon $[[G^{(o)}, V_b^{(o)}], U_b^{(o)}]$; and an *aspect-view of relative frequency* estimates the *numerical values* of the ratios $n(e_{br}^{(1)})/N$ from this sequence of N iterations, which are also the values *in the sense of D5.1* of the aspect-view of relative frequency. Afterward, on a subsequent level – so here the level 3 with respect to the initial level 0 – a convenient operational-conceptual generator of object-entity, say $G_{br}^{(3)}$, selects as meta-meta-object-entity the whole sequence of ratios

$$\sigma_{br}^{(3)} = [n_1(e_{br}^{(1)})/N, n_2(e_{br}^{(1)})/N, \dots, n_q(e_{br}^{(1)})/N, \dots]$$

where $e_{br}^{(1)}$ is an event from the algebra of events $\tau_b^{(1)}$, and the number N of iterations of the involved random phenomenon is increased toward infinity *via* some sequence of increasing integers $N_q, q=1, 2, \dots$. The meta-meta-object-entity $\sigma_{br}^{(3)}$ selected by $G_{br}^{(3)}$ is examined *via an aspect-view of probability* (convergence, $V_{prb}^{(3)}$) say, which checks for the existence of a convergence in the sequence $\sigma_{br}^{(3)}$ and, if the convergence does exist, estimates the limiting numerical value

$$p_{br}^{(3)} = \lim_{N \rightarrow \infty} [n(e_{br}^{(1)})/N]$$

which also is a value *in the sense of D5.1* of the aspect-view $V_{prb}^{(3)}$. So on this last descriptonal level, of relative order 3, the acting epistemic referential is $(G_{br}^{(3)}, V_{prb}^{(3)})$. The meta(metadescription) produced by it is

$$D^{(3)} / G_{br}^{(3)}, \sigma_{br}^{(3)}, V_{prb}^{(3)} \equiv P_{br}^{(3)}$$

So the probability measure on the whole algebra of events $\tau_b^{(1)}$, is

$$p_b^{(3)} \equiv p^{(3)}(\tau_b^{(1)}) \equiv \{p_{br}^{(3)}\}$$

where r runs over the whole index-set of events from $\tau_b^{(1)}$. Since $\tau_b^{(1)}$ is a **logical classifying organization** of the elementary events $ee_{bi}^{(o)}$ from $U_b^{(o)}$, the syllogistic constructions embedded in the algebra $\tau_b^{(1)}$ can be quite naturally associated with numerical probabilistic estimations. If furthermore $\tau_b^{(1)}$ is the total algebra on $U_b^{(o)}$, the probability measure $p(\tau_b^{(1)})$ defined on it concerns also the elementary events from $U_b^{(o)}$.

The MRC connection between logic and probabilities is fully achieved.

This connection *starts* on the level of the elementary-event descriptions $ee_{bi}^{(o)}$ where repetitions of the involved random phenomenon are permitted. So – quite satisfactorily – it leaves out, *beneath* it, the strictly individual level of the MRC-logic, concerning testimonial propositions tied with *one replica* of an object-entity of a given sort: the MRC-logic begins

at a deeper level than the MRC-probabilities. But the MRC-probabilities end above the MRC-logic and qualify numerically the statistical zone of the MRC-logic, by values of limits of convergent statistical sequences.

The branch-probability chain stemming from a one-branch basic epistemic referential. So a basic branch-probability-chain $[P_b, U_b] \rightsquigarrow [U_b, \tau_b, p(\tau_b)]$ admits of the MRC representation

$$[P_b^{(0)}, U_b^{(0)}] \rightsquigarrow [U_b^{(0)}, \tau_b^{(1)}, p^{(3)}(\tau_b^{(1)})]$$

which can also be written in various other more detailed forms. The elementary-event-descriptions $ee_{b_i}^{(0)}$ are achieved inside the epistemic referential $(G^{(0)}, V_b^{(0)})$, each event-descriptions $e_{br}^{(1)}$ from $\tau_b^{(1)}$ introduces its own epistemic metareferential $(G_{br}^{(1)}(V_{br}^{(1)}), V_{br}^{(1)})$, and the probabilistic description $p^{(3)}(\tau_b^{(1)})$ of the algebra of events $\tau_b^{(1)}$ is achieved inside the epistemic meta-metareferential $(G_{br}^{(3)}, V_{prb}^{(3)})$. On these writings one can read the whole essence of the genetic and hierarchical MRC structure of a branch-probability-chain.

A branch-probability-chain as represented above is the MRC equivalent of a classical Kolmogorov probability space for the case that a basic epistemic referential is at work.. This equivalent transcends already a classical probability space. Each one of the elements introduced by it is explicitly relativized to the generator of object-entity and the view introduced by the epistemic referential involved in the generation of that element. The descriptive relativities cannot all be read directly on the final synthetic representations chosen above, but they are all explicitly available, and they can be made manifest in the symbolizations whenever this is wanted. The operational and the conceptual structure of the random phenomenon which founds the space, as well as the hierarchical structure of the space itself, become apparent. Each one of the involved descriptive entities (actions or results of actions) is endowed with an explicit definition and an own symbolization:

*One disposes now of entirely specified moulds for **expressing** the whole genetic and hierarchical structure of a basic branch-probability space.*

A mathematician might perhaps hold that these specifications amputate the generality of Kolmogorov's purely set-theoretic-algebraic representation. But such a criticism would have to be dismissed. Indeed, as shown already, the mathematical generality of the classical concept of probability can also be regarded as a source of lacunae, and the MRC representation dissolves the lacunae without interdicting the use of more synthetic expressions and treatments.

We are now ready to introduce the major novelties produced by MRC inside the probabilistic conceptualization, namely the concept of probability tree and the correlative clarification and complexification on the meaning of what is called probabilistic independence or dependence.

The probability tree of a basic epistemic referential. It follows immediately that the *integral* probabilistic phenomenon which stems from a basic epistemic referential $(G^{(0)}, V^{(0)})$ where $V^{(0)} = \cup_b V_b^{(0)}$, $b=1,2,\dots,n$, can be represented as follows:

$$[[P^{(0)}, U^{(0)}]] \rightsquigarrow \cup_b [U_b^{(0)}, \tau_b^{(1)}, p^{(3)}(\tau_b^{(1)})]$$

This representation points toward a new probabilistic metaconstruct. This metaconstruct constitutes a *probabilistic unity*, in this sense that in all the branches involved by it, the *same* generator $G^{(0)}$ of object-entity acts, creating a common "trunk", namely one same sort of object-entity $\alpha^{(0)}$ which then plays a key role in the emergence of *all* the n distinct branch-probability-spaces $[U_b^{(0)}, \tau_b^{(1)}, p^{(3)}(\tau_b^{(1)})]$, *connecting them genetically*. This new probabilistic metaconstruct will be called *the probability tree of the basic epistemic referential* $(G^{(0)}, V^{(0)})$. It will be symbolized by $T(G^{(0)}, V^{(0)})$.

The classical theory of probabilities of Kolmogorov does not define such a construct.

But in quantum mechanics a particular instance of this very construct does manifest itself, implicitly. One operation of quantum-state-generation (playing the role of basic generator $G^{(0)}$) produces one microstate (holding the role of basic object-entity $\alpha^{(0)}$) and all the quantum mechanical probability measures defined for this unique microstate, but concerning the outcomes of all the mutually incompatible groups of commuting quantum mechanical observables (holding the role of basic branch-views $V_b^{(0)}$), are calculated from the *unique* state-function ψ and the involved quantum observables. A given group of compatible quantum mechanical observables, produces a universe of factual elementary events (marks registered on a measurement-device) – each one codable in terms of this or that eigenvalue of an observable from that group – which has *no common element* with the universe of factual elementary events produced by another group that is incompatible with the first one; in this sense the mentioned universes of factual marks are mutually exclusive. So the algebras – *Booleean* algebras – constructed on each one among these mutually exclusive universes of elementary events, are equally mutually exclusive. Hence, by asserting probability measures on these mutually exclusive

algebras, one finally obtains a whole set of distinct probability spaces, but *all associated with one same state-function ψ* . In MRC terms, one obtains a *quantum mechanical probability tree* (refs. 15-17, 19, 22). This situation – but in the *absence* of an explicit concept of quantum mechanical probability tree – has been amply discussed (Mackey, Gudder, Suppes, Van Fraassen, and many others) because it is devoid of a corresponding general form in Kolmogorov's abstract theory of probabilities, so it does not yet possess a defined probabilistic status. In particular, various attempts have been made at defining *one* metaprobability measure corresponding to the unique involved state-function and involving somehow the branch-probability measures. But, as far as I know, no consensus has been reached as yet concerning a satisfactory solution. Therefore what is called “quantum probabilities” is still considered to constitute an unsolved problem of the probabilistic conceptualization.

Furthermore, the situation sketched out above has also induced attempts at the examination of the logico-algebraic nature of the *global algebra* consisting of the union of all the mutually exclusive branch-algebras of events tied with one state-function.

And this global algebra has been found *not to be Boolean*. Which constitutes the “problem of quantum logic”.

Nowadays quantum-logicians seem to consider to have solved this problem by assigning a lattice-structure to this global algebra. But such a structure appears as inadequate as soon as one becomes aware that (**a**) the logical conjunction is not a universal logical connector (cf. ref. 16 and V.1.2) and that logical complementation is a relative operation (cf. ref. 41 and V.1.2).

In this context, the interest of the general MRC-concept of probability tree, seems clear: it becomes possible to deal with the questions of quantum probabilities and of quantum logic inside quite general and organized framework (it is in this way that meta[quantum mechanics] is developed (cf. the Introduction)).

But independently of this specific perspective, it is remarkable by itself that MRC, where exclusively the fundamental descriptive mould is drawn by generalization from the epistemic strategy practised in quantum mechanics, brings forth at the *top* of its elaboration the metaconstruct of a probability tree, of which the quantum probabilities appear *a posteriori* as a particular realization, and where a corresponding global algebra of events is contained that is by construction open to syllogistic-logical qualifications that are naturally tied with probabilistic qualifications.

On the logic obeyed by the global algebra of events from a probability tree. Consider the union $\cup_b \tau_b^{(1)}$, $b=1,2,\dots,n$ of all the algebras of events from all the n distinct branches of a given probability tree $T(G^{(0)},V^{(0)})$; we denote it by $\tau_T^{(1)}$ and call it the *global algebra from $T(G^{(0)},V^{(0)})$* . How can the logical specificities of $\tau_T^{(1)}$ be pertinently represented? In the present context we make only the following remark.

A probability tree $T(G^{(0)},V^{(0)})$ is equivalent to the basic genetic class $C[G^{(0)},V^{(0)}]$, supposed to end up with a probabilistic description of the involved basic object-entity $\alpha^{(0)}$. So the principles sketched out in V.1.2 concerning a calculus with genetic classes, conjugated with the characterization of a probability tree achieved above, permit inside MRC a guided, a dominated specification of the logic of a global algebra $\tau_T^{(1)}$, freed from arbitrary assumptions like an *a priori* posited lattice structure, and enriched by an explicit awareness of all the involved descriptive relativities (in particular the relativity of complementation) as well as of the logical consequences of the mutual exclusions that stem from strict factual individuality.

Probability trees versus probabilistic dependence. Kolmogorow (ref. 68) wrote:

“.....one of the most important problems in the philosophy of natural sciences is – in addition to the well-known one regarding the essence of the concept of probability itself – to make precise the premises which would make it possible to regard any given real events as independent.”

But Kolmogorov's approach is purely mathematical. The criteria for probabilistic independence are researched exclusively and directly as formal criteria working on a directly posited abstract mathematical structure. The specificities of the involved *physical* phenomena are *never* taken into account. If only one probability space is considered, two events A and B from the algebra τ from this space are just posited to be independent if the numerical product $p(A)p(B)$ of their probabilities is equal to the probability $p(A \cap B)$ of the product-event $A \cap B$, in the set-theoretical sense. This same definition is generalized to also the case when A belongs to one algebra, and B to another one, but *presupposing* always that the conjoint outcome of A and B is possible, which, in MRC terms, amounts to embeddability of both algebras in one same space, by the definition of a conveniently enriched coding-view for the interpretation of a factual outcome. But the concept of probability tree of a basic transferred probabilistic description brings into evidence that

Kolmogorov's definition of probabilistic dependence or independence, is not a general definition.

The winding line along which this definition fails when two distinct branches of a same probability tree are brought in, can be followed in detail. Let b_1 and b_2 be two distinct branches of a probability tree $T(G^{(0)},V^{(0)})$. The product-event $A \cap B$ of two events A and B with A from b_1 and B from b_2 , is *systematically* the null-event, because A and B , being produced by different random phenomena, cannot contain common elementary events: they belong to algebras

$\tau_{b1}^{(1)} \neq \tau_{b2}^{(1)}$ constructed on two universes of elementary events $U_{b1}^{(0)} \neq U_{b2}^{(0)}$ which are produced by two distinct and *mutually incompatible* branch-examinations $V_{b1}^{(0)} \neq V_{b2}^{(0)}$, and so contain no common elementary events. In these conditions $p(A \cap B)$ is always zero. Now, zero is different from the quantity $p(A)p(B)$ as soon as both A and B are possible, so this might mean systematic dependence. Therefore, at a first sight, one might think that finally Kolmogorov's definition works well. But the same reasoning holds for also two events from two branches from two different probability trees, and in this case why should there *always* be dependence? Obviously the seemingly satisfactory systematic nullity of the quantity $p(A \cap B)$ when it is calculated for events A and B from two different branches of a same tree, in fact is just an automatic, meaningless reaction of a formalism, which is exceeded by what is tried to be described by its use.

Kolmogorov's formal definition of probabilistic dependence/independence simply is *alien* to the concept of probability tree. It stems from a classical experiential background where situations like those introduced by probability trees are not taken into account³².

Such situations have not even been conceived on the basis of the experiential background from which the classical theory of probabilities has been drawn.

On the other hand, according to the "theory of transformations" from the Hilbert-Dirac formulation of quantum mechanics, given two incompatible quantum mechanical observables X and Y and *one* state-function ψ , the probability $p_\psi(y_i)$ of the occurrence, for the microstate with state function ψ , of (any) one given elementary event y_i consisting of an eigenvalue of the observable Y, is a functional

$$p_\psi(y_i) = F[p_\psi(X)]$$

of the whole probability *measure* $p_\psi(Y)$ concerning the same ψ and the observable X, the form of the functional F being specified by Dirac's calculus. Inside quantum mechanics this formal fact is regarded as just a calculational "rule" concerning the passage from the "representation" of the state-ket $|\psi\rangle$ expressed in the basis (the Hilbert referential) corresponding the observable X, to the representation of $|\psi\rangle$ in the basis introduced by the observable Y: *no specifically probabilistic significance is assigned to the above-mentioned functional relation*. So *a fortiori* no physical significance either has been researched. But when it is reconsidered from the point of view of the MRC concept of a probability tree (cf. 15-17, 19, 22), Dirac's transformation $p_\psi(y_i) = F[p_\psi(X)]$ acquires the significance of a relation of probabilistic *metadependence* which express the physical kinship, the *semantic kinship between the contents of all the various branches*: two distinct branches of a same probability tree refer indeed to two different and non commuting quantum mechanical observables, but they concern *one same microstate*, generated by a unique operation of state-generation and represented by a unique state-function state-ket $|\psi\rangle$. So it leaps to one's eyes that Dirac's transformations, apart from their formal calculational role, express also an effect of the uniqueness of the considered microstate, upon the nature of the contents from all the distinct branches. And they express it, not as a probabilistic dependence in the classical sense, but as a non-classical probabilistic *metadependence*: *each* elementary probability $p_\psi(y_i)$ from the branch of the tree corresponding to the observable Y, depends, not *individually* on this or that other elementary probability $p_\psi(x_j)$ from the branch corresponding to X, but on the set $\{p_\psi(x_j)\}$ of *all* the elementary probabilities from the branch of X (on the whole probability measure $p_\psi(X)$).

In III.2 it has been shown how quantum mechanics has opened up the way toward the construction of MRC. Now it appears that MRC permits to identify a deep probabilistic meaning of Dirac's theory of transformations. We shall complete this process of spiraling double-way mutual influence as follows.

Suppose a probability tree $T(G^{(0)}, V^{(0)})$ where, in every branch b, the *total* algebra on the involved universe $U_b^{(0)}$ is chosen (which contains also all the elementary events $ee_{b1}^{(0)}$). We make the natural – even inescapable – assumption that the unique generator of object-entity $G^{(0)}$ which contributes to the emergence of all the branches of $T(G^{(0)}, V^{(0)})$, induces, *via* the corresponding object-entity $\alpha^{(0)}$, a semantic kinship between the contents of these branches, at all the three involved levels, the level of elementary events, the level of the algebras of events, and the level of the probability laws. We posit that there exists a "degree of similitude" between the contents placed at the same descriptonal level of any two branches (on different levels there cannot be comparability), which is somehow determined by the "angle" between two distinct "b-directions of examination" of the unique basic object-entity $\alpha^{(0)}$. So we expect observable manifestations of this kinship. Concerning these – on the basis of the fact that the quantum mechanical probability trees are particular instances of the general MRC-concept of probability tree – we postulate what follows.

The semantic kinship between the contents of the branches of a probability can be conveniently expressed mathematically on the probabilistic level, by admitting that each probability of an *elementary* event from a branch b_k of $T(G^{(0)}, V^{(0)})$, depends on the *whole* probability *measure* from any other branch b_q , *via* a functional relation

³² In so far that it is always possible, for any set of correlated spaces, to construct by cartesian multiplication one space that contains all the spaces from this set, the confinement inside one branch holds also for the classical concept of probabilistic *correlation*, not only for that of dependence.

F of which the precise form has to be specified in each case by an experimental-theoretical approach appropriate to the particular nature of the involved phenomena³³.

Then the *set of all the distinct branch-probability measures from all the distinct branches of $T(G^{(o)}, V^{(o)})$, interconnected by the above-positd functional relation, constitute together an **observable** metaconcept of probability measure that characterizes globally the probability tree $T(G^{(o)}, V^{(o)})$* (there is no need of a unique metaprobability-measure).

Furthermore, since a probability tree $T(G^{(o)}, V^{(o)})$ of the epistemic referential $(G^{(o)}, V^{(o)})$ is equivalent to the basic genetic class $C[G^{(o)}, V^{(o)}]$ of the same referential, the possibility of a logical calculus with whole genetic classes draws attention upon the possibility of a corresponding probabilistic calculus with probability trees considered as *wholes* (for the particular case of quantum mechanics cf. refs. 15-17). General rules of composability of two or more different trees can be defined, involving *specific* sorts of probabilistic dependence (or correlation, this distinction will have to be re-defined), namely between two distinct trees involving different generators of object-entity but the same branch-views, or *vice versa* the same generator and different branch views, etc. This completes the domain of probabilistic-logical research opened up by MRC.

As for the probabilistic dependence between two events A and B belonging both to the algebra from one same branch b, Kolmogorov's definition holds, of course. But inside MRC it is furthermore "explained" semantically, namely again as a manifestation of a community of nature between any two elementary events or events from a same branch, induced *genetically* by the unique generator of object-entity $G^{(o)}$. This last sort of dependence is certainly stronger than the metadependence postulated above, because it is induced by the conjugated actions of the involved basic generator $G^{(o)}$ and the involved basic branch-view $V_b^{(o)}$. Furthermore it is estimated numerically, which is not the case for the probabilistic metadependence between distinct branches. These features explain why the classical probabilistic dependence has been remarked since a long time, while the metadependence brought forth by MRC has not been discerned. So:

The classical concept of probabilistic dependence, considered so important by Kolmogorov, becomes *intelligible*, and it is included in a larger concept of probabilistic dependence which is organized in zones of dependences of different natures and of different degrees.

A last consequence of the MRC concept of probability tree, and not a minor one, concerns "causality".

The hierarchical and probabilistic dependences brought forth by the concept of probability tree, and their connections as expressed by the to-be-elaborated calculus with whole probability trees, yield a new, very organized framework for the representation of the still so vague concept of *causality*. Inside this framework it might be possible to define precisely mutually distinct concepts of causality, dependence, and correlation, as well as the relations between them.

Second stage. A minimal space-time model of the random phenomenon from a probability tree: genetic set (genset).

We have much stressed before that in consequence of the facts expressed by the frame-principle P8, we are unable to think about physical phenomena outside space-time. Since a basic probability tree is founded upon a physical random phenomenon, as long as an explicit space-time representation is not offered, in some way or other some inexplicit and unrulid space-time representation will nevertheless surreptitiously creep in. Which might produce confusion. So let us explicate accordingly to MRC a space-time structure that can be assigned to the random phenomenon involved by a basic probability tree.

The minimal intrinsic metaconceptualization $[\min.D_1^{(1)}/D^{(o)}]$ (D19.2) of a basic transferred description $D^{(o)}$ and the minimal model $[\min.M(\alpha^{(o)}/V^{(o)})]$ extracted from it (D19.3), have "explained" the involved basic object-entity $\alpha^{(o)}$ in terms of a bulk of potentialities of future and relative observable manifestations located inside a space-time domain $[\hat{c}r.t_o]$. They also posited that the basic processes of examination of $\alpha^{(o)}$ corresponding to the various successions $[G^{(o)}, V_g^{(o)}]$ with $V_g^{(o)} \in V^{(o)}$, transpose the relative potentialities of observable manifestations confounded inside this bulk $\alpha^{(o)}$, into the *actualized* observable marks of which the transferred description $D^{(o)}$ consists. But the space-time structure of these processes of actualization has been left inexplicit. In the definitions of the concepts $[\min.D_1^{(1)}/D^{(o)}]$ and $[\min.M(\alpha^{(o)}/V^{(o)})]$, the accent has been placed on the basic object-entity $\alpha^{(o)}$. However, in consequence of the frame-principle P8 and of the principle P10 of mutual space-time exclusion, it seems clear that the posited processes of actualization possess a *tree-like* space-time structure (as have anticipated the denominations of "trunk", "branches", and "probability tree"). Let us now establish this assertion. Let us make use of the rennotations in terms of branches b

³³ If the sort of basic object-entity that is involved, has not a wave-like nature like in the case of a quantum mechanical microstate, there is no *a priori* reason for admitting a principle of superposition, though such a principle might be found to hold. If it comes out that the principle of superposition is semantically inadequate, the whole mathematical framework of a Hilbert *vector* space, would have to be conveniently modified. A blunt transcription of the quantum mechanical mathematics would be meaningless.

introduced at the beginning of V.2.3. Consider now the repeated realizations of the basic successions $[G^{(o)}.V_b^{(o)}]$ with $V_b^{(o)} \in V^{(o)}$ which generate the global random phenomenon $[P^{(o)}, U^{(o)}] = \cup_b [P_b^{(o)}, U_b^{(o)}]$ from a probability tree. *The processes from these successions are themselves physical entities.* So according to the frame-principle P8, each such process covers some space-time domain. The process of generation by $G^{(o)}$ of a replica of $\alpha^{(o)}$, present in any realization of any sequence $[G^{(o)}.V_b^{(o)}]$, covers always a *same* space-time domain – with respect to an origin of times renewed each time that an operation $G^{(o)}$ is *started* –, thus determining a common trunk of the space-time representation of the random phenomenon. While P10 entails that the space-time domains covered by incompatible $V^{(o)}$ -examinations with $V_b^{(o)} \in V^{(o)}$ – always started from an origin of times taken when the creation of a replica of $\alpha^{(o)}$ has just been *achieved* – cover *distinct* space-time domains. So, together, all the successions $[G^{(o)}.V_b^{(o)}]$ with $V_b^{(o)} \in V^{(o)}$ cover indeed a tree-like space-time domain.

What has been said so far concerns any basic transferred description, no matter whether individual or probabilistic. From now on we concentrate upon the probabilistic basic transferred descriptions.

We have shown that the initial definition denoted $D^{(o)}$ was insufficient in the case of a probabilistic basic description, and we have completed it, thereby obtaining the concept of probability tree $T(G^{(o)}, V^{(o)})$. So, instead of $[\min.D_1^{(1)}/D^{(o)}]$ we re-write now $[\min.D_1^{(1)}/T^{(o)}]$ where $T^{(o)}$ is an abbreviation for $T(G^{(o)}, V^{(o)})$.

Consider now the set $\{ee_{bi}^{(o)}, i \in I\}$ of elementary events (descriptions) produced in a given branch b from $T(G^{(o)}, V^{(o)})$. From a logical point of view, these constitute a *class* – labelled by b – of observable configurations of factual marks bk , each mark being coded in terms of only conceptually distinguished values of the various aspects bj from b , whereby an elementary description $ee_{bi}^{(o)}$ is obtained. But from a set-theoretic point of view, the elementary-event-descriptions $ee_{bi}^{(o)}$ constitute a set of such marks. Therefore we shall speak of *the class-set b* of elementary events $ee_{bi}^{(o)}$. Then the elementary events produced in all the distinct branches b from $T(G^{(o)}, V^{(o)})$, constitute the set of class-sets $\cup_b \{ee_{bi}^{(o)}, i \in I\}$, with $b=1,2,\dots,n$. If now we associate to each element from $\{ee_{bi}^{(o)}, i \in I\}$, the space-time representation of its *whole genesis* such as it is posited by the minimal intrinsic metaconceptualization $[\min.D_1^{(1)}/T^{(o)}]$, we obtain a *new* set of class-sets, with a new sort of elements. We call it *the genetic set of class-sets* from $T(G^{(o)}, V^{(o)})$, or the *genset* of the basic epistemic referential $(G^{(o)}, V^{(o)})$, and we symbolize it by $\mathbf{Gen}[(G^{(o)}, V^{(o)})]$. An element from a genset will be called a *genetic element*, in short a *genelement*. Then the genset $\mathbf{Gen}[(G^{(o)}, V^{(o)})]$ is the set of all the sets of genelements assignable to the elementary events from $T(G^{(o)}, V^{(o)})$. This endows us with the researched minimal space-time representation of the physical random phenomenon involved by a probability tree $T(G^{(o)}, V^{(o)})$ (the algebras of events $\tau_b^{(1)}$ and the probability measures $p(\tau_b^{(1)})^{(3)}$ on these, with $b=1,2,\dots,n$, are *conceptual* metaconstructs of increasing order, superposed on the physical geneses of the elementary events which constitute the physical support of $T(G^{(o)}, V^{(o)})$).

The concept of probability tree $T(G^{(o)}, V^{(o)})$ leaves imprisoned in the only half-conceived, both the basic object-entity $\alpha^{(o)}$ and the geneses of the elementary events $\{ee_{bi}^{(o)}, i \in I\}$. The genset $\mathbf{Gen}[(G^{(o)}, V^{(o)})]$ associated with $T(G^{(o)}, V^{(o)})$ draws them into the clearly conceived and communicable. This is a pragmatic improvement³⁴.

Consider now a genelement from a genset. It cannot be considered to clearly *belong* to the genset, because it does not entirely *pre-exist*. It possesses three mutually distinct modalities of existence that come into being successively. A genelement is first only abstractly and prospectively distinguishable inside the minimal intrinsic model $[\min.M(\alpha^{(o)}/V^{(o)})]$ assigned to the basic object-entity $\alpha^{(o)}$, namely as "one" among the bulk of all the as yet non realized, mutually non individualized relative *potentialities* of which $\alpha^{(o)}$ is imagined to consist. This only mentally, prospectively individualized potentiality, undergoes then a *process of actualization*, whereby the previous potential whole labelled $\alpha^{(o)}$ is - entirely - consumed. And finally the observable end of this process of actualization, an elementary description $ee_{bi}^{(o)}$, is obtained as a stably *actualized* result, whereby the previous processual state of actualization also becomes in its turn entirely consumed. So there is a passage that leads from an undivided whole labelled $\alpha^{(o)}$, to this or that one among all the observable ends $ee_{bi}^{(o)}$, the material trace of the process that led to $ee_{bi}^{(o)}$ being each time effaced. This passage brings into play the whole depth of the Aristotelian and Kantian modal dimension which goes from potentiality to actuality, while it also shrinks down the potential undivided whole labelled $\alpha^{(o)}$, into this or that *individual*, actualized, phenomenal manifestation labelled $ee_{bi}^{(o)}$. So saying that a genelement "belongs" to the genset $\mathbf{Gen}[(G^{(o)}, V^{(o)})]$ to

³⁴ The theory of elementary particles, more or less implicitly, works with gensets. It *associates* to purely predictional probability distributions of the type of those defined in fundamental quantum mechanics, *minimal models* constituting gensets in which the quantum mechanical sets of state-observables and of objectivities (cf. note 31) are enriched with other, sub-quantal state-observables and objectivities.

which it contributes, would amount to a brutal *a posteriori* simplification whereby the differences between the successively involved modalities of being are occulted, duration is eliminated, and instead, a fictitiously fully "present" whole is instated: a sort of surreptitious geometrization harboured by the totalizing word genesis. While in fact, as it will appear below, the temporal and modal characters *act* inside the genset $\text{Gen}[(G^{(0)}, V^{(0)})]$, they dictate there their *own* specific logical and probabilistic laws which are incompatible with co-presence. Indeed the fact that it is meaningless to write down the logical conjunction of two propositions concerning two testimonial descriptions that consist of two distinct elementary events asserted for one same replica of the object-entity $\alpha^{(0)}$, (V.1.2) is intimately tied with the modal dimension along which a genelement comes into observability; and the same remark holds concerning the systematic nullity of the product of the probabilities two distinct elementary events.

As far as I can see, the sort 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). The concept of genset stems from the necessity, at the limit of an exhaustive representation of the very first phase of a chain of conceptualization, to accomplish separately *two*, and mutually *independent* epistemic operations, first an operation of basic generation of an unknown object-entity, and then a subsequent basic operation of qualification of this basic object-entity. Only physics, only modern microphysics in fact, has been able to reach this limit and thus to bring forth the explicit recognition of the necessity specified above. In mathematics the connections with pure factuality are much too remote to bring into evidence a so highly counterintuitive necessity. Moreover, though instated inside microphysics as an implicit practice, this two-steps cognitive strategy has furthermore had to be recognized to bear the germ of an innovating general descriptive method³⁵. And this recognition has then had to be worked out into a fully explicit and general concept of transferred basic description, explicitly connectable with classical logic and probabilities *via* the general concept of intrinsic metaconceptualization of a basic transferred description. A quite peculiar and long way to be gone through. So it is not surprising that the sort of set called here a genset has not yet been considered so far.

The mathematical theory of the gensets – like the calculus with genetic classes, and in relation with it – remains to be elaborated under the guidance of the nucleus of MRC. What operations can be defined between the genelements from one 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 classical set theory and the genset theory (what are the *specific* conceptual consequences of the genset theory) ? From the start on, on the basis of the results already brought forth in V.1.2 and in V.2.3, one can assert what follows.

The to-be-achieved theory of the gensets is tied with a deep non-classical unification between the epistemological foundations of modern microphysics, set-theory (so mathematics), logic, and probabilities.

Indeed in so far that mathematics as a whole can indeed be derived from the concept of set, the unification between logic and probabilities achieved by the concept of probability tree, should in its turn be embeddable into a still wider unification, namely between logic and mathematics, as founded on genetic sets.

Inside MRC the classical concept of set can be regarded as a sort of projection of the concept of genset, onto a vault, onto a covering metasurface. A projection that imprints all the as yet mutually non-individualized potentialities from $\alpha^{(0)}$, simultaneously and directly, onto the final level of the already individualized-and- actualized, thus smuggling away the peculiarities of strict individuality, the initial status of mere prospective and relative potentiality, and the subsequent processes of actualization with their non removable *relativity* to views. Time is thus eliminated, and an absolutizing totalisation is performed, a "geometrisation" on a surreptitiously introduced metalevel of description. The "problem" of actualized infinities might be intimately related with this kind of hidden conceptual leap. As G. Longo put it³⁶: «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». But the concept of genset might lead to a calculus with sets of *processes* that start at the local, purely factual and strictly individual origin of this or that chain of conceptualization, and then involve the whole modal dimension that leads from potentiality to phenomena. This, probably, would achieve, for the definition of a set, the maximal liberation of *a priori* constraints. Indeed the primitive sets were introduced by pointing toward the elements, one by one. This confined to a finite number of pre-existing and directly perceivable elements. Then Cantor and Frege introduced sets defined by predicates P . This enlarged the concept of set to the case of also an infinite number of elements, material or conceptual, but restricted by the requirement of a *pre-decided* common property. The physical operational definition of the geneses from a genset frees now of also this last restriction: it produces a set of "long elements" where the final observable structure of qualifications appears as the result of a succession $[G^{(0)}, V_b^{(0)}]$ of two operations, so the choice of the succession can be closed *after* the realization of the first fragment, the operation $G^{(0)}$; so the *a priori* constraints on the production of this or that configuration of observable qualifications, are left open as long as possible.

At the bottom of the chains of conceptualization, the MRC-concept of genset knits together physical factuality, and communicable knowledge, by space-time representations of physical operations. Thereby it stabilizes and amplifies the mental perception of the local, strictly individual zero-points of the chains of conceptualization, and incorporates explicitly their unifying consequences. Here, like in the basic transferred descriptions, the seminal action is the

³⁵ The present author is still rather isolated in this recognition.

³⁶ During a session of the Center for the Synthesis of a Formalized Epistemology.

generation, out of the depths of pure factuality, of as yet unknown object-entities, each one of which is conceivable as a factually specified bulk of non-conceptualized *being*. J. B. Grize, in a private comment on this work³⁷, called this «une "motte" de *quid*, sémentisable mais encore non-sémentisée». And then, in the representation offered by a genset, one can clearly follow how, out of this initial bulk, *via* appropriate operations of examination and codings of the observable results of these, are drawn phenomenal manifestations that can be incorporated into language-and-knowledge. It becomes clear that the evolutions of this sort, though mute and ignored, can be conceived to *proceed incessantly*, defeating the impossibility, with mere words, to genuinely 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. Reference, explicitly rooted into physical factuality, *beneath* language, is tied with a structure of communicable terms which, without saying it, point toward it, thus showing it to the mind (as Wittgenstein would put it).

Third stage. On the significance of a probability measure

Throughout the preceding development it has been supposed that in each branch from a probability tree, the relative frequencies of the outcomes of the events from the algebra do converge toward a corresponding probability law. What is the meaning of this hypothesis? And what does a probability measure represent, when it exists?

The answer to the first question has become rather obvious in the course of the elaboration of the nucleus of MRC. Given an epistemic referential (G,V), basic or not, if the generator of object-entity G and the view V do mutually exist in the sense of D7, then they can be usefully conserved only if *furthermore* many repetitions of all the successions [G.V_g] with V_g ∈ V produce some stable global structure of gk-values, a structure that offers a support for being named, communicated, for being used as a basis for intersubjective knowledge and for action. The existence of a probability amounts to just the existence of a such a stability, namely a “feeble” non-individual one.

The answer to the second question is less straightforward. I introduce it by an example. Imagine a puzzle consisting 100 small squares; each square is covered by a small coloured form and bears on it a tiny inscription of the values of two space-coordinates $x=1,2,\dots,10$ and $y=1,2,\dots,10$. The available forms can be labelled by $j=1,2,\dots,m$, with m much smaller than 100 so that the same form can occur on several different squares. If the squares are arranged in the spatial order indicated by the xy -values, a certain rough picture is obtained, say of a landscape. But let us ignore the xy -values, mix well the 100 squares, and put them in a bag. We then play the following “probability game”. We draw a square from the bag, we note in j -terms (j -value) what image we see on it, we put the square back into the bag, and we mix well the squares. We repeat this procedure a big number of times N , say $N=1000$. What will happen? A certain total number $m < 1000$ of distinct “values” j of coloured form will come out, and each one of these will appear with a certain relative frequency $n(j)/1000$. If we then increase N more and more, for instance by choosing first $N=10^6$ and afterward $N=10^6$, etc., what will happen? Most among the relative frequencies corresponding to the various notations j , will manifest a convergence toward the total number $n_l(j)$ (landscape) of j -images from the picture of a landscape on which the puzzle is founded. And if N continues to be progressively increased, this convergence will progressively appear for *all* the m distinct notations j , thus determining a probability law $\{p(j), j=1,2,\dots,m\}$ with $p(j)=n_l(j)$ for any j . It seems clear, I suppose, that this will happen. We are convinced of this. But *why*? Because, we think, the picture of a landscape *is in the bag*, parcelled and mixed up, extracted out of its ordering spatial support, but nevertheless constantly the same before each new trial as for its content of small-coloured-forms-in-a-square. So even though we do not take into account the xy spatial coordinates to effectively reconstruct the form, this global form will nevertheless finish by manifesting its stable presence inside the bag, when N is increased toward infinity. Namely *via* precisely the convergence of the relative frequencies $\{n(j)/N, j=1,2,\dots,m\}$ toward the limiting probability law $\{p(j), j=1,2,\dots,m\}$: this “law”, for each value j , connects the relative frequency $n(j)/N$, to the number $n_l(j)$ which is a characteristic of the puzzled landscape. So in this case we believe in the existence of a probability law $\{p(j), j=1,2,\dots,m\}$ *as an expression of the global picture of a landscape, coded in the parcelling language of relative frequencies of values j of coloured form by which we have access to this global picture.*

The above example is extremely simplifying. In general, when we perceive events obeying to a probability law we have no *a priori* knowledge of a global gk-space-values form associated with the studied random phenomenon. Furthermore the situations similar to the puzzle are far from being the rule. Indeed the coloured forms on squares, like the global picture itself, are just intrinsic models extracted implicitly from spontaneously accomplished intrinsic metaconceptualizations. But we do not always perceive directly results of spontaneously accomplished intrinsic metaconceptualizations, while the corresponding basic transferred descriptions are achieved by reflex processes genetically wired in our automatic neuro-physiological functioning. Often we are *exclusively* in presence of transferred data, as it happens systematically in microphysics and also quite often in biology, medicine, cosmology, etc. Moreover usually *time* comes in also, like in meteorology, in the study of the accidents on highways, and so on. Nevertheless the example provides us with essential clues which permit to integrate the following general conclusion.

Everything which in the physical world can produce communicable knowledge, can produce it *only* as a form of space-time-aspect-values endowed with some stability in the sense of D14.1, i.e. as a description which obeys the frame principle P8. Sometimes, that which in the description plays the role of object-entity is *such* – with respect to what plays the role of view – that the description comes out to be probabilistic, not individual in the sense of D14.1.

But then, in the obtained probability law – systematically – CERTAIN ORGANIZING SPACE-TIME FEATURES GET LOST. The existence of the probability law, however, is a sign that these features exist, that also *other* representations involving the semantic content that is brought in by the considered probability law are possible,

³⁷ Grize, J.B., in a letter to the present author.

inside *other* epistemic referentials which bring into play meta-aspects that we have not perceived, and which are essentially *tied to space-time qualifications* (distances, angles, etc.) and therefore lead to a [space-time-aspects-*form*] which “makes a global sense”.

Which means *only* that, if it were known, this metaform would “explain” the observed probability measure, in the following sense. According to the above interpretation the relative frequencies $n(gk)/N$ that characterize the outcomes of events $e \equiv gk$ from an algebra τ from a probability space, can be regarded as coded “messages” stemming from an unknown metaform of $g'k'$ -space-time-values, where $g'k'$ are meta-values of one or several *meta*-aspects with respect to g , say g' , – with $g' \neq g$ – which are **INDELIBLY tied with space-time values** (space-time *distances* separating gk -values inside the metaform, space-time “directions” (space directions or successivities, or both) of gk -qualifications, etc.). By their convergence, the relative frequencies $n(gk)/N$ construct progressively, by parcelled random touches, a gk -coded purely numerical representation of this unknown metaform. A sort of random and approximate but asymptotic “reading” of this unknown metaform, which offers only cryptic reflections of the global structure of space-time-metavalues- $g'k'$; reflections that are **impoverished and PULVERIZED by the extraction from this structure, of the space-time specifications (so also of the $g'k'$ qualifications which disappear when space-time is projected away)**. The elementary probabilities $p^{(3)}(gk)$ are the ideal limits toward which the readings of these coded messages $n(gk)/N$ tend when N is progressively increased toward infinity. And the whole probability measure $\{p^{(3)}(gk)\}$, considered globally, is a precise numerized – but only ideal – expression of this entire cryptic, impoverished, randomized reading in terms of relative frequencies $n(gk)/N$, of the unknown metaform of space-time-metavalues- $g'k'$.

The *intelligible* referent – in the sense of the frame principle P8 – of a probabilistic description, is a corresponding metaform of *space-time*-metavalues- $g'k'$ involving “globalizing” meta-aspects g' which are different from the aspects g involved in the countings of relative frequencies $n(gk)/N$ from the considered probabilistic description, and are essentially tied with space, or time, or both space and time.

As long as the space-time *integral metaform* that got lost in the pulverizing extraction of gk -values which led to the considered probability law $\{p^{(3)}(gk)\}$, is not reconstructed, this referent stays unknown. Then, in consequence of the frame principle P8, the probabilistic description involving the probability law $\{p^{(3)}(gk)\}$ floats in a no-man’s-land between communicable knowledge and absence of knowledge, because it is a description without an intelligible referent. This is so *even* if the description is *not* a basic, a transferred description, like in the class of situations examined before in the sequence of definitions D19. Such is the force of the frame principle P8, its irrepressible demand of intelligibility *in terms of space-time models*. And here lies the mystery of the probabilistic descriptions³⁸.

It is striking to note to what an extent the MRC significance of a probability law specified above, is consonant with *the Popperian concept of “propensities”*³⁹.

Furthermore, it is also striking to note that an “information source” in Shannon’s sense consists by definition of an “alphabet of signs” (these can be denoted gk) on which a probability measure is posited ($\{p^{(3)}(gk)\}$, with this notation), and the theorems of the theory of information concern *the source as a whole*, not this or that individual message expressed in terms of the signs from the alphabet; which is the major queerness about the theory of information. Thereby:

The metaform of *space-time*-metavalues- $g'k'$, cryptically expressed by $\{p^{(3)}(gk)\}$ in a pulverized way, is omnipresent throughout the information theory.

Often it is an abstract metaform. But even then it still is a *form*, i.e. it admits of a model in an abstract space where a certain topology organizes distances in simultaneity or in succession, and abstract directions, of which the probability laws $\{p^{(3)}(gk)\}$ gk yield only pulverized reflections⁴⁰.

V.2.4. Conclusion on the MRC probabilities

By reference to Komogorov’s theory of probabilities and to quantum mechanics, the method of relativized conceptualization produces a deepened and enlarged theory of probabilities which is intimately tied with the MRC logic, with the theory of sets, and with the information theory.

³⁸ Until some 20 years ago, only probabilistic meteorological descriptions were available, expressed *exclusively* in terms of relative frequencies of gk -events (rain, wind, sun, etc.) tied with empirical probability laws. Nowadays these events are explained, they are *understood* as “messages” which “code” for a definite integral metaform of *space-time*- g' -values (g' : zones of depression, etc.).

³⁹ Ref. 72 p. 33: “Take for example an ordinary symmetrical pin board, so constructed that if we let a number of little balls roll down, they will (ideally) form a normal distribution curve. This curve will represent the *probability distribution* for each single experiment, with each single ball, of reaching a possible resting place. Now let us “kick” this board; say, by slightly lifting its left side. Then we also kick the propensity, and the probability distribution,.....Or let us, instead, remove *one pin*. This will alter the probability for every single experiment with every single ball, *whether or not the ball actually comes near the place from which we removed the pin*.we may ask: “How can the ball ‘know’ that a pin has been removed if it never comes near the place ? ” The answer is: the ball does not “know”; but the board as a whole “knows”, and changes the probability distribution, or the *propensity*, for *every* ball; a fact that can be tested by statistical tests”.

⁴⁰ For instance, in English, the word «mother» is nearer to the word «love» than is the word «war». So, after having received in an on-going message the word (the sign) mother, the conditional probability for the next word to be «love» – as calculated from the relative frequency for the successions of two words in English – is bigger than the conditional probability that the next word be «war».

A genetic class that leads to a probabilistic description, and the corresponding probability tree, appear as *two faces of one same logico-probabilistic concept*, of which a genset offers a minimal space-time intrinsic model, while the theory of information associates to it algorithms and theorems concerning communications coded in terms of “signs” extracted from the metaform of space-time $g'k'$ -values tied with the involved probability laws: *a deep-rooted and wide unification*.