"[.] The concept is a 'cutting out' in a stream of experiences infinite in its extension and depth, and infinitely changeable" [MARRADI], why in a note about the Methodology and especially about the Logic of social research comes out the need to put as beginning notion of concept, traditionally considered as a philosophically one? An answer to this question can’t resolve in a simple observation of the fact that the definition from which this work begins is given by a methodologist of Social Sciences. Which are the reasons that induce to consider this notion as a fundamental one? Analysing the parts making the definition, which contributes it is able to give for a reading, partially new, of the Logic and the Methodology of Social Sciences? These are questions which presuppose a thought regarding the way of thinking and, therefore, investigate the reality itself meant as the world of social relationships [AMPOLA; GIVIGLIANO], these are questions which regard, also, the position and the functional character of each single scientific discipline in the Science considered as a whole, these are questions which don’t look for an exhaustive answer, but are the starting point for suggestions, reflections, discussion.

The first point to analyse is made up of the attempt of understanding why a philosophical term, till now considered such as this in the most of cases in which it is given a 'scientific' use, it is used now in a Social Sciences context.

It isn’t neither going to confirm the hypothesis of lack of development of these last as it is token fright by Winch [WINCH] according to which in many cases Sociology turned out to be (and continues to do it) an aborted Gnoseology, nor it is going to propose a simple homologation of all 'scientific' language in something like as an all-inclusive Begriffsschrift [FREGEA] of Science.

The answer it is in the analysis of what Morin calls "Complex Science" [MORINA]: Science can't be no more considered as a set of completely separated disciplines, extremely divided among them by something like an invisible wall, revealed when it is necessary to claim positions of prevalence or of precise competences. The experience of the Santa Fe Institute [WALDROP] it isn't only an excellent example of which is the development now in progress in the conceptual elaboration in the
scientific universe, but also of the way in which it is strictly connected with a reality which can't be investigated without a science meant as a complex unit [MORIN]. The reality itself, in some way, imposes this situation to us: the dynamics of which the social subjects are today producers and products (at the same time) need to be understood of a work of mutual exchange and coevolution from the traditional field of knowledge which are each time implicated. This process eliminates the rigorous boundaries laid out by Descartes [DESCARTES; CERUTI; BOCCHI-CERUTI] defining parallel routes on the knowledge: to get the prove of the Fermat's Theorem by Wiles [ACZEL] many domains of mathematics had to give their contribution in form of direction of contextual and mutual development.

In the Methodology and in the Logic of social research there is the necessity, therefore, today to use and to study in depth a perspective which considers instruments developed in other scientific domains, not only the notion of concept, but also, for example, the notions of fractal object, non-linear dynamics, chaos, to succeed in give an adequate reading of the world of social relationships. With adequate is meant the possibility of using a rationality not restrained by excessive lacks of information due to a solipsistic and a negative (in this case) autoreferential inflexibility, or due to a blind rely to what a solemn and exact science gives. Paradoxically the definition of Methodology itself gives problems of boundaries among different disciplines, underlining close links, sometimes degenerating into a overlapping, among this and alternatively Epistemology and the techniques used in the researches [BRUSCHI]. With the term Methodology, therefore, it is possible to mean the ensemble of methodology (in a more 'philosophically' sense), methods and techniques, used to give an adequate reading of what is the phenomenon to analyse in the relationships among its structural components. What holds together, in a complex way, according with a point of view which presents domains not strictly separated, these three fields is Logic.

Towards a Methodology, which has the features to be "[...] an engineeristic discipline, because it is involved in modifying states of the world; a cognitive one, as this states of the world are cognitive ones; a prescriptive one, in the sense that, given fixed goals, informs as attain them, working out rules" [BRUSCHI], Logic puts itself in the double form as frame of the general thought architecture and as main line for the techniques and the instruments used. These two aspects are not so far as it could think, there isn't a strong contrapposition between trascendent and immanent,
between the world of ideas and the physical one. A first point of contact between the two cores of this triangle can be found in the term concept itself. A concept, in the general thought framework is the result of a categorization process of the subject/man according to logical modalities and properties, result which is then translate in a such form (always by means of and in properties and assumptions of logical types) to can be used in a research project by the techniques which are chosen by the subject/man as researcher.

Speaking about Logic, in a first moment, it is impossible not think and make reference to the Aristotelian one with its three foundation principles and to the so-called Classic one which put together to the first one a formalism sometimes exagerated by contexts of historical evolution of thought. The principle of identity, the principle of contradiction, the principle of the excluded middle, the formalised logic of Boole, are the irreplaceable (or so believed) point of references of the frame in which till now the scientific thought has grown. Frege himself, for his logical foundation of mathematics, after having express the irreplaceable necessity of a Begriffsschrift [FREGEa], had to measure his strength against the notion of identity [FREGEb].

Now it could think to have determined the adequate Logic for the Methodology of social research, this because it is possible to notice a remarkable coherence among some concepts developed by Frege [FREGEb, FREGEc, FREGEd] and some theorical ideas coming from the method of Social-Historical Sciences of Weber [WEBER]. Frege, by the proposition which holds the presumed identity between the words Hesperus and Vesper, works out the distinction between \textit{sinn} and \textit{bedeutung}, connoting the former as a way of thinking an object (for the singular terms), as a thought that a proposition expresses (for the propositions); while the latter is the object to which the name belongs to (for the singular terms), the truth value expressed by a proposition (for the propositions). Focusing the attention on \textit{sinn}, rule of identification of the respective \textit{bedeutung}, it is impossible refrain from thinking the assumption of a point of view according with Weber's idea [WEBER] as the specific relationship of a subject to an object of the real world in function of an ideal type made by the subject himself. If with the definite description "the animal best friend of the man" and with the other one "the animal opposed to cat" we refer to the dog, the \textit{bedeutung} is the same, but the \textit{sinn} is different, we can assume the "dog" as an ideal type and the two definite descriptions as specific point of view from which investigate
different features of a real 'object'. It is, therefore, possible to use the construction of
the analysis of language made by Frege in a methodological context like Weber's one,
it is the same to say that it is assumed as Logic of reference the Classical one. Infact, if
the meaning of a proposition is given by its truth value, according with Frege this
values aren't other then "the truth" and "the falsehood" [FREGE], we are in the
kingdom of the principle of excluded middle, it isn't given a possibility different
from two taken in consideration. The analogy between the sinn and the assumption
of a point of view come back taking in consideration the predicates, in a such way to
give an example of application of the instrument 'concept' in the logic of social
research. Taking as bedeutung of a predicate a concept (function whose values are
truth values [FREGED]) the sinn results to be a way of thinking the concept, as a
consequence the ideal type coincides with the domain of the variables replaced to the
free occurences in a concept in a such way to have the same truth value. The focus is
the determination of the membership or not membership of a character to the set of
the expressions which identify an ideal type, total membership or total non
membership.

This type of Logic isn't adequate any more for a Methodology that wishes to give a
reading of a complex world of social relationship such that one made by the
interactions-relationship among subjects/men. The Weber's ideal type can still result
useful, as well as Frege's analysis, however we have to bring about an intrinsic change
of perspective. The total membership, so the complete coherence and internal
completeness of a set starting from precise theoretic premises can't be considered the
dividing line for an adequate conceptual categorization. The Weber's methodology in
its forming of the ideal type have to be able to consider assumptions of points of view
which don't reflect close boundaries. The Bedeutung have to consist for the
propositions and predicates of both truth values which are not exhaustivelly the truth
and the falsehood and concepts which are not in Cantor's sets.

The idea of a complete formalization of Mathematics by the Logic, on certain and
unquestionable foundations, has failed in the moment in which the Gödel's Theorem
has made its appearance in the outline of the development of the thought. The
Hilbert's program wanted to arrive to the prime foundations of mathematics [NAGEL-
NEWMAN; CELLUCCI], to escape the contradictions in the science which had to be the
reference one. Gödel proved by his results on incompleteness that this was nothing
else than a dream, something belonging to the world of Platonic ideas; as Popper will
argue, the objective truth can't be else then a regulative ideal to which aim with the consciousness of never can achieve it [POPPERA, POPPERb]. The main problem, indeed, consists just in verifying how a truth definition on a dichotomic base isn't adequate neither in the formal level, nor as a knowing interface with the world of social relationships. [AMPOLA; GIVIGLIANO].

Classic Logic base itself on a notion of extensional type set [MORICONI], which follows the formalization given by Cantor, which fell in the paradox noticed by Russell in his Principia Mathematica [RUSSELL-WHITEHEAD]. The sets have well defined border lines, is always possible to say if a given element belongs to a sets or not, this giving a truth value to the proposition which asserts the inclusion of that object (according with the bivalent formalization given by Boole [BOOLE]): 1 for the membership, 0 for the non membership. All this in a formal axiomatic system: provided with a vocabulary of symbols; with composition rules of these symbols; with transformation rules and with axioms, chosen among well made propositions, by which it is possible to give a reference base for the whole system. All the propositions derived from the axioms by a consecutive application of the transformation rules are called Theorems [NAGEL-NEWMAN]. The coherence problem arises and at the same time divides exactly in this point: are identifies an internal coherence, regarding the mutual non contradictoriness of the theorems from a specific interpretation; and an external one regarding the truth of a theorem after its interpretation. The intersection between the two types of incoherence concerns the starting problem of the completeness of a formal system to the extent that it is possible to infer from a prefixed set of axioms every true propositions.

Gödel solves definitively the problem of completeness and coherence by the formulation of a theorem which proves the incompleteness of Arithmetic, as well as it is essentially incomplete: as far as axioms it is possible to add to a formal system, it will always be possible to make a proposition that will let rise a contradiction in the system itself. The Gödel's Theorem can be enunciated in the following form: in each formal system with an axiomatic strength, at least as the Peano's Arithmetic, it is possible to make a proposition starting from the axioms such that neither it, nor its formal negation can be proved in the system itself. The whole procedure, by which it is possible to arrive to this result, can be sum up in five fundamental points: 1. By codification (the numbers have the double nature of number and label, as labels given to every propositions characterize a formal calculus completely arithmetised) and by
a diagonal procedure (method invented by Cantor to prove as an object doesn't belong to a given list) it is possible to make a proposition which asserts its own non demonstrability in a axiomatised formal system; 2. The proposition so made it is provable if and only if its formal negation is demonstrable too, to conserv the coherence none can be proved in the system; 3. This proposition also if isn't demonstrable it is true; 4. The set of the axioms of the system is incomplete, it isn't possible to infer from it every arithmetic truth, it isn't only incomplete, but it is essentially incomplete; 5. The Arithmetic itself isn't coherent because it is possible to make another proposition which logically implies the precedent one and this implication is formally provable.

By Gödel's Theorem it is possible to understand in which way the Classical Logic makes big difficulties towards the processing of the concepts of truth, membership, demonstrability. Its strictly dichotomic connotation isn't able to justify many constructions especially when it is used to investigate a reality in which social subject act not simple symbolic equations, an example is easy to obtain starting from the categorization of the concepts identifies by Frege as functions, expressible, by predicates of a formal system, mediated and applied by subjects in the every day experiences. Also in the general structure of the Science and sciences level, the research of theories internally coherent leads to some contradictory results, therefore, compelling to a re-examination of what the Methodology have to be. [[AMPOLA, Advanced seminar 97, Fac. Pol. Sci., University of Pisa].

Taking on again the double connotation of the Logic towards the Methodology of research, we have to replace the Classic one as general framework of reference with another more adequate one, firstly from a formal point of view, secondly in its relation with the world of social relationships. We need Fuzzy Logic. Formally born in the 1965 in the article of Lotfi A. Zadeh, *Fuzzy Sets*, [ZADEH] doesn't pretend to eliminate and to take the place of bivalent logic. This latter, infact, results to be adequate for all a series of borderline cases that perfectly follow a vague and fuzzy connotation (peculiar features of the new approach), but they are perfectly treat by the truth values 1 and 0. What Fuzzy Logic reads again in the logical knowing outline is the principle of the excluded middle. There isn't, therefore, a strictly bivalent structure, there are not only two possibilities, there isn't, however, the simple introduction of one or more values different both from the "truth" and the "falsehood", how was in the multivalue logics of classical type. It makes, firstly, a
change in the concept of characteristic function as a function which is able to assign only two values; the new functions, the membership functions, assign evidences that identify the degree of membership of a given features to an object [TERMINI]. We go from an extensional conception of the sets in which 'objects' are collected, to another intensional one, there isn't any more the problem if an 'object' belongs to a set, to identify it by its content, but the question is "how much" it belongs, the rule becomes the functional graduated cluster. There is also a conceptual gap towards probability. The substantial difference between a distribution of probabilities function and a membership function is that the former is standardised to 1: the problem is to define the probability of being in a set, but the presence and the absence have a bivalent characterization; while the membership functions define the presence degree that has not to be necessarily the complement to 1 of the non presence one, both degree depend by the construction, eventually, different of two distinct membership functions. The Gödel's Theorem isn't any more, therefore, revealer of a contradiction as that one arising in the Computability Theory: taking on the set of the provable propositions as a subsets of the truth propositions one, it is, however, possible to make a true proposition, but not provable, whose negation is false and undemonstrable, starting from the consideration of the set of the true proposition as a productive one and of the provable propositions set as a recursively enumerable one. Using the conceptual frame of Fuzzy Logic it is possible to note how the proposition in question has truth and demonstrability degrees, belongs with a certain evidence to the set of true propositions and with another one to the set of false propositions, but the two evidence have not to be the same, the starting contradiction is used to have an additional information and a larger adherence to the substantial structure of the relation [GIVIGLIANO]. The Gödel's Theorem becomes organic in this new type of logic, identifies a way to manage the principle of the excluded middle.

For the Methodology of social research, this change in the reference logic implies a larger adequacy in the reading of what is the world of social relationships. A world, a reality structurally and substantially complex. Introducing the concept of social networking of interaction-relation the social subject is defined as a set of coordinates on the dimension of the reality [AMPOLA]. There isn't any more a classification in mutually exclusive set, there are parts of membership determined on the base of functions which locate the temporally state of a subject/man towards he himself, the others, the general relational context. Functions that by mechanisms of feedback,
don't give in a spatially and temporally definitive way the location of everyone. The resultant is a unit of a complex type of the reality \([\text{MORINb}]\), on the base of the tetralogic link among order/disorder/organization, whose turning platform is made by the interactions among the subjects/men and the context/environment \([\text{MORINb}]\). This in the Morin's reading, in that one here we want to give, it is the first step to can analyse a system based upon social networking. To the three principle that are the base of the Morin's approach, the dialogic principle, the principle of recourse of organization and the hologrammatic principle \([\text{MORINA}; \text{MORINb}]\) we have to unit a different connotation of both time and space, Prigogine has given some informations on this way \([\text{PRIGOGINE-STENGERS}; \text{PRIGOGINE}]\), these suggestions have to be constestualised now, there is a multiplicity of dimensions, not only spatial ones, but also temporal ones, a plurality of states of semi stable equilibrium which locate the relational coordinates of the subject/man. Intend it as set of membership values, of evidences resulting from the membership functions which identify this dimensions, mean substantially a new process of categorization for the researcher. Categorization that uses Fuzzy Logic in its values in that spaces and times in relation with themselves and the whole context. Categorization that can't set aside to identify as a fractal object \([\text{MANDELBROT}]\) this situation, defining as fractal dimension the dimension of the meaning of the subjects/men in interaction \([\text{GIVIGLIANO}]\). This is only the first step, consequently the whole world of social relationships can be identified by a fractal form, a figure with given area, but with a infinite perimeter, a form which gives a membership by parts to each of its dimensions, parts that change according with the complex interactions which include the researcher, who is at the same time in and out its study 'object', makes and modifies as well as every other subject/man the reality.

The position of the researcher in the structure and in the logic of the research follows, as starting and reference point, the approach given by Methodological Individualism that identifies in the subject the logical atom of the reality \([\text{BOUDON}]\). In the network this location makes possible the be structured, on the base of the interactions-relations, of every dimensions. We are in front of a subject who participates, by parts of membership, in what he studies; a subject that can obtain answers only if he explicitly admits this own inclusion \([\text{PRIGOGINE-STENGERS}]\) in linguistic games \([\text{WITTGENSTEIN}]\) that allow him an adequate conceptualization, so, the possibility of a reading of what are the phenomenons in their evolving spatially
Turning back to the definition given at the beginning of the term concept \[MARRADI\] it is now possible, analysing it in its structural determinations, to give a reason of the perspective change in the relation Frege-Weber in function of the complex approach read in terms of Fuzzy Logic. "[\_] The concept is a 'cutting out'"\[\], in each linguistic game spatially and temporally defined on the dimensional axes of the social network the subject/man makes a choice of what is his experience \[MARROU\], of what are the structural parameters of his categorization rules, he makes membership functions to understand and give a sense to his being in the world. "[\_] in a stream of experiences infinite", the dimensions on which the subject/man shifts in the determinations of semi stable positions are an infinite set, it isn't possible to include in a close Cantor' s set the interactions by which it is possible to establish relations continuously made and modified, that then contribute to make the subject/man, the area of this set is given, but its perimeter is infinite, its form is fractal. "[\_] and infinitely changeable" the reconsideration of the categories of space and time, going farther then the Einstein's reading, make possible to understand how in a fractal structure, the subject/man in his analysis of complex phenomenons, can't assume as a paradigmatic one the Cantor's set definition, the change in his conceptual categories is also given by the fuzzy structure of his senses, a structure which follows the three principle of tha Morin's complexity. In substance we have underline how the subject/man have to make an analysis of the parts of membership in the dimensions of the social networks, to read a fractal structure and, so, to understand a complex reality; the conceptual framework and the operational instruments refer to Fuzzy Logic.

Frege in his analysis of natural language and Weber in his methodological suggestion have fixed some points that we have to read again according with the new logical assumption. The perspective change have to bring to a consideration of the inclusion by parts as establishing of the determination of the concept, meant, as a membership function in the ideal type making. The domain of the expresions which replaced to the free occurences in a concept give the same truth value can only be a fuzzy set, in relation with, the existing report among the given evidences is inferred by the membership functions as are made by the subject/man, no more by inclusions which are formalised by mutual exclusive values. The \textit{sinn} of a predicate results to be the making rule, the categorization rule, of an 'experiential cutting out', of a
membership function; the assumption of a point of view isn't anything also then the construction of a membership function which doesn't determine a single feature, but the evidence of a feature in a relational situation. From a consideration of an extensional type, we move to an intensional one, starting from certain borderline we arrive to a infinite perimeter.

The proposal of a different Logic from the classical one makes, so, possible not only an adequate reading of what results to be the world of social relationship meant as a network, but the used of the Gödel's Theorem as a premise and an instrument in a conceptual framework which is able to analyse, by the complex approach and the ideas coming from Methodological Individualism, the social network as a resultant of non-linear dynamics and non-linear itself: "[...] Models like these seemed to have the right features: points of stability mixed with instability, and domains with changeable borderlines. Their fractal structure gave the type of quality infinitely autoreferential that seemed to be so central in the ability of the mind of making ideas, decisions, emotions and all other products of the conscience." [GLEICK].
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