

Riccardo Viale

Methodological Cognitivism

Vol. 1: Mind, Rationality, and Society

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*In memory of my father
To Tancredi, Vittoria and Lucia*

Foreword

When Massimo Egidi, Robin Marris and I collaborated with Herbert Simon in 1992 on the publication by Elgar of the book “Economics, Bounded Rationality and the Cognitive Revolution”, the contribution of cognitive sciences to the theory of social rationality, and in general to the development of social sciences, was absolutely marginal and contested in Europe and in the United States. Cognitive sciences were seen with suspicion by sociologists, economists, political scientists, anthropologists and even philosophers. I had already experienced this type of hostility from the philosophical world directly a few years earlier, in Oxford in 1984. When I proposed the outline for my doctorate thesis in the Philosophy of Science, I had to overcome a great deal of hostility and disparagement on the part of my supervisor towards the issue of the *cognitive theory of science*. In Europe, in particular, the neopositivist culture still prevailed, maintaining a clear separation between the context of discovery and justification, an opinion strenuously sustained even by a non-neopositivist like Sir Karl Popper. Methodological rationality could not be analysed empirically because of the risk of falling prey to the mortal sin of naturalistic fallacy. The naturalistic revolution of W.O. Quine and the contribution of philosophers like Steven Stich or Alvin Goldman were not represented in the philosophy of science. Even Larry Laudan, who had considered the problem of the empirical-historical evaluation and justification of methodological rationality, was not part of the mainstream of the philosophy of science and was underestimated in Europe. My work in Oxford and my subsequent work at the L. Bocconi University of Milan, where I began to teach Logic and Epistemology as part of the course in Economic and Social Disciplines (DES) in 1987, provided the basis for my book “*Metodo e Società nella Scienza*”, which was published in 1991, soon after Ronald Giere published his “*Explaining Science*” in 1988. Both set out to propose a naturalistic approach to the philosophy of science. Mine also argued in favour of the explanatory supremacy of the cognitive approach over the social approach in the study of the dynamics of conceptual change in the scientific community. This book is both a synthesis of my work on the *cognitive theory of science* (which will be the subject of the second volume) and the start of two working programmes, one in the epistemology and methodology of social sciences designed to overcome the intentionalism and rationalism inherent in the current Methodological Individualism, and the other designed to develop the cognitive foundations of social rationality, with particular reference to the economic context.

Where the first programme is concerned, the contemporary references were Raymond Boudon and Jon Elster. I introduced the term *Methodological Cognitivism* for the first time in 1994, to define the proposal of an individualistic methodology of social sciences, that based its theory of action on a causal model of the mind-action relationship. To develop this programme, I had to analyse a number of issues related to the philosophy of mind, the epistemology of causality, the methodology of social sciences and the cognitive models of reasoning and decision-making. In the years between 1997 and 2001, some of these issues were refined at the meetings of the Scientific Network of the European Science Foundation “Human Reasoning and Decision Making”, particularly the encounters at the Sorbonne, Paris IV and the College de France. My recent work on methodological cognitivism, which developed in the direction of neurocognitive social sciences and the theory of mirror neurons in particular, was triggered by a theory of the strong identity between the mind and the brain.

My work on the cognitive theory of rationality, particularly in an economic context, evolved in parallel in that same period, from 1987 on. From the 1988 seminar with Herbert Simon at the Rosselli Foundation in Turin, until the conference on “Cognitive Economics” at the Bocconi University in Milan in 1996, the subsequent creation of the magazine *Mind & Society* in 2000 and, after Simon’s death, the foundation of the Herbert Simon Society in 2008, numerous initiatives have enabled me to develop Simon’s programme. The term “Cognitive Economics”, which I coined at the conference in 1996 and subsequently returned to in the publication of the proceedings *Cognitive Economics* (1997), underlines an “extreme” attempt to overcome the epistemological bottlenecks of experimental economics and the scientific bottlenecks of behavioural economics. Only a reformulation of the theory of economic action according to the best models of neurocognitive sciences can stimulate positive economics and its realistic and empirical goals.

And finally, we come to the empirical work undertaken with Dan Osherson from 1995 on the inductive models of reasoning based on categories. This work was undertaken in Italy, but also in Vietnam at the University of Ho Chi Min City, and in New Delhi at the Indian Institute of Technology, and it allowed us to study the effects of the membership of different cultural or social groups on inductive reasoning among adults and children, and in particular the application of the “difference principle” and the Bayesian model. These studies of cognitive anthropology also contributed to the debate taking place in the scientific community, between supporters of relativism and of epistemological and cognitive universalism, and between those on innate bases or the cultural bases of the inferential capabilities of the human brain.

I have had the good fortune to develop some of these considerations at the Bocconi University in Milan, at Milan Bicocca University and at the Scuola Superiore di Pubblica Amministrazione in Rome, where I taught, and during periods spent at foreign universities such as Oxford, Aix en Provence, Fribourg, Rice-Houston, California-Santa Barbara and Columbia.

This volume of selected papers is divided into three parts to reflect the division into the three areas of study described above.

A second volume will be published in 2012. It will contain selected papers on cognitive theory of science, social epistemology, tacit knowledge and knowledge transfer. In any case both volumes are characterized by a common denominator: the *Methodological Cognitivism* as the new methodological tool to analyze the social action.

“*Mind, Rationality, and Society*” is the first book of Selected Papers, “*Methodological Cognitivism*”. Most of the chapters are modified versions of earlier publications. In this regard, I wish to first thank Laura Gilardi, without whose punctilious and professional editorial assistance I would not have been able to complete the work.

My main scientific debt is to Herbert Simon, who has been a constant benchmark for my work over the years.

Among those who are no longer with us, I am particularly indebted to Norberto Bobbio, who taught me to see new horizons in the relationship between the philosophy of science and human sciences. I must also mention Kathy Wilkes for her important comments on the philosophy of mind, and Martin Hollis for his considerations on the theory of rationality.

My encounter with Sir Karl Popper marked an important moment in my development; his intellectual reference has been fundamental throughout the years.

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Many of the issues examined in this volume have been discussed at seminars or developed in research organised by the Rosselli Foundation in Turin from 1988 to 2008. For this reason, I would like to thank all those people who have made these important meetings and research possible, first and foremost Daniela Italia, Anna Mereu, Laura Gilardi.

A final thank you goes to Barbara Fess of Springer for her patience and for the interest she has always shown in the publication of my work.

And finally, this book would have been impossible without my wife's help, support, and advices.

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Riccardo Viale

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The volume is divided into three parts and 14 chapters. The Introduction will be based, mainly, on parts of the various chapters of the volume.

Part I “*Cognitive Rationality and Society*” deals with the philosophical justification of *methodological cognitivism*.

The first chapter of the Part I “*Psychologism and Anti-Psychologism*” is dedicated to a short historical excursus on the fortunes and misfortunes of psychologism in methodology of social science. A number of key positions will be illustrated, without any desire for historical completeness but with the aim of establishing the premises for the arguments developed later in the book. The chapter starts with a question of John Stuart Mill: “*Are human actions subject to invariable laws like all other natural events? Are they really ruled by the constant of causality that underlies every scientific theory of successive phenomena?*” (Mill, 1st edition 1843; 8th edition 1956; Italian translation 1968, VI, I, § 1, p. 827). Mill answer that empirical generalizations are possible about society. They are generalization of some aspects of social life. However they derive their truth from causal laws, of which they are the consequence. If we are familiar with those laws, we know the limits of the derived generalizations; instead, if we have not yet justified the empirical generalization – if it is based on observation alone – then there is no guarantee in applying it out with the limits of time, place and circumstance in which the observations were made. Causal laws that can justify empirical generalisations must refer to the human mind. In other words, the laws of ethology, derived deductively from the laws of psychology, should allow us to explain the different characters of social or national contexts in the presence of different starting condition. But are the fundamental laws of psychology that constitute the causal barycentre of social explanation.

Mill’s position was either neglected or criticised by later contributions to scientific methodology. These were marked by a generalised antipsychologism expressed by authors whose theses were radically divergent on other essential methodological questions. Marx, Weber, Menger, L. von Mises, Popper, von Hayek, Watkins, Boudon, Elster all share a stringent criticism of Mill’s psychologism and, more in general, of the thesis concerning the reduction of social action to causal mechanisms

of the human mind. It is significant that Popper takes Marx as one of the main objects of his critical analysis, but he finds himself in complete agreement with his antipsychologism and with the Marx's famous maxim: "It is not men's conscience that determines their being, but, on the contrary, their social being that determines their conscience" (Marx, Italian translation 1971, p. 5). According to Popper "The error of psychologism consists in claiming that methodological individualism in the field of social sciences entails the need to reduce all social phenomena and all social regularities to psychological phenomena and psychological laws" (Popper, 5th edition 1966; Italian translation 1974, vol. II, p. 131).

What kind of methodological individualism is justified by psychologism. Regarding the epistemic dimension only the *non-reductionist* option seems justified. What can be explained is only the particular social event (that is considered a linguistic fiction without any real content) and the explanation is based on laws and the starting conditions of individuals and their properties (therefore it cannot be considered an explanatory reduction of social events to laws and facts about individuals). This variation of Epistemic Individualism has no substantive ontological implications relating to what we propose as laws on individuals and their properties. The possibility of social laws is implicitly denied because the ontological existence of social phenomena is rejected. It is not assumed, however, which type of entity and individual properties are important for the explanation. The entities might be everything related to individual action. At the ontological level psychologism does not include *physical atomism* which seeks to explain social events on the basis of the physical and behavioural properties of single individuals. On the contrary, psychologism can be interpreted as a form of *psychological atomism* that intends to trace social events back to the individual's mental properties. Psychological atomism supports that only acceptable explanations of mental states are those accomplished by empirical science, by knowledge on human psychology and that the only relevant facts for individualistic explanation are the mental ones.

While the main stream of MI was antipsychologist until the recent past, from the 70s onwards the Millian tradition started to put forward new interpreters. For example Homans' thesis is that the explanation of social events by psychological propositions cannot be proved philosophically. It is a matter of empirical investigation and analysis. He states that all social phenomena can be analysed without residue into the actions of individuals. And since methodological individualism entails psychologism, all sociological facts can be explained by the use of psychological propositions.

The final paragraph of the chapter drafts the outline of an hypothesis, which I dub *methodological cognitivism*. It can be regarded as an evolution of methodological individualism given that it appears to neutralise some of its epistemological and methodological difficulties and is more firmly rooted in the fabric of scientific knowledge, which is now more widely accredited in the study of social action, that is cognitive science. The epistemological reasons for choosing cognitive science as a source of models to give scientific content to our individualist hypothesis are the following.

Causality. Cognitive science, in all its variants, includes the search for compatibility of mental states and processes with their brain substratum. This physicality of mental activity meets the requisite for continuity and spatial and temporal contiguity that is typical of all causal relations. The type of explanation of action offered by cognitive science is of a constituent nature in that it aims to identify the intimate causal mechanisms responsible for behavioural output.

Empirical nature. Cognitive science gives considerable importance to empirical research for the construction and checking of hypotheses. In experimental research, in the form of tests and in computer simulation, it is possible to make an independent determination of the starting conditions and the falsification of the hypothesis.

Irrationality. Cognitive science satisfies the principle of symmetry. Not only so-called rational behaviours but also irrational ones are explained by the same type of hypothesis.

Theoretical support. Cognitive science is not alone, instead it has or tries to have the theoretical support of some of the most accredited hypotheses of the scientific community. The search for this link is shown by the current debate on whether an overly strong characterisation of cognitive activity in linguistic terms is compatible or not with evolutionary theory, in view to the evolutionary delay with which language appeared. There are also significant links with Shannon's information theory, with Wiener's cybernetics, with Turing's and von Neumann's mathematical and computational models, and with the predominant theories of neurochemistry, neurobiology, neurophysiology and neuropathology. Support for cognitive science could also be found in the opposite direction. The importance of language and of inferential activity in moulding social relations is beyond doubt. The relationship is clearly biunique, but the constraints and limits with which the mind elaborates and filters return input from social relations are fundamental to explain the role of social factors in individual action. These constraints show a certain degree of regularity, which allows generalisations to be drawn that are useful, also at a predictive level, and which can provide support for compatible so-called *social theories*. One need only think of the potential importance of the decision-making heuristics in relation to economic theory, or of the theory of mental models in relation to the sociology of knowledge.

The second chapter "*The Mind-Society Problem*" deals with the relationship between mental and social phenomena. Often the "problem" is mediated by concepts like individual action or decision. In other cases the problem is implicit or even hidden. Nevertheless, every methodology of social sciences must, sooner or later, "cross the street" that connects mind and society. In the same way as the parallel mind-body problem, the mind-society problem concerns a number of variegated fundamental philosophical questions. These are metaphysical when they deal with the existence of one or more ontological levels of reality between mind and society; with the efficacy of social causation as distinct from individual mental causation; with the feature of social properties as second order properties compared to the first order mental properties; and so on. They are epistemological

when they privilege the problem of explanation and representation. There are two strong critiques to the tentative reduction of social phenomena to mental mechanisms. The first and most powerful critique is what we might call the “hermeneutic surrender”. The second can be termed the “holistic illusion”.

In its most radical version the first critique claims that every individual action is so full of subjective social meaning that it can never be explained objectively, but only interpreted as we do for paintings and poems. The champion of this approach is Charles Taylor (1985) and the methodological model is Max Weber’s concept of *verstehen* (1949). This affirms that there are no general laws that allow us to predict or explain the social action, nor we can hope to discover them. We can divide this position in two claims: (a) the interpretation of social action is not made according to general laws; (b) the meaning of social action is not reducible to general natural facts of the human mind.

If we fully accept the first claim – that there are no explanatory generalizations in social sciences – the most coherent conclusion is that it would be impossible even to describe the external behaviour of the social actors. In fact every description implies a certain amount of general categorization expressed by concepts being used in the description. Moreover, many of the behavioural concepts imply some kind of general psychological hypothesis. Lastly, the use of general psychological hypotheses is unavoidable if, as prescribed in the *verstehen* methodology, we want to understand the mental states of the agent. How can the hermeneutic social scientist infer the agent’s mental state from a knowledge of his behaviour and of the social and cultural context? By applying some general hypothesis regarding the relationships between his beliefs, desires and actions. Namely, by applying a general theory that we usually call *common sense* or *folk psychology*.

Concerning the second claim the meaning of a social action is not reducible to general facts of the human mind because, according to hermeneutics, mental properties are not reducible to physical properties. Therefore they cannot be explained by laws referring directly to the properties of aggregate physical entities. The properties of mind are different from the properties of brain (property dualism). If hermeneutics implicitly supports the previous concept of mind, it therefore entails the impossibility to make an appeal to any form of causal explanation of social action. In fact, causality is a property of matter and can refer only to relations between events in the physical world. Moreover, if the thesis of completeness of physics is correct, any causal relation at any level of aggregation of reality should be reducible to an explanation at an inferior level. Any claim of causal relation at a given level can be accepted if a causal explanation is available based on the properties of entities at the underlying level of aggregation of nature. It seems that property dualism cannot allow this kind of causal explanation. If we want to establish a causal picture of the relations between mind and action we must avoid having to rely on any kind of property dualism. Only a strong identity theory between mental and neural properties can let us work out causal models that try to explain the mechanisms of individual action. It is obvious that some methodologies of social sciences like hermeneutics do not share either the premises and the conclusion of this argument. There is an alternative solution. As affirmed by

Kim (1998), the identity between mental properties and neural properties does not imply the elimination of the mental dimension. Even if the claim of identity is that the causal role is played exclusively by the neural realizers of the mind and there is no autonomous and separate mental causation, it is possible to preserve the property dimension of the mind for practical reasons. The mental property will be considered second order property of the neural first order property, that is a property of having a property in the neural base with given causal potentials (functional reduction).

There are two different research programme linked to these alternative options. Strong identity theory seems to incline towards the eliminative option, represented by computational neuroscience. On the contrary the second functionalist reduction is coherent with most of research in cognitive psychology. The first programme tries to derive psychological concepts starting from neural phenomena, while the second starts from the mental level of rules and representations and tries to find the neural counterparts. In other words, one is bottom-up and the other is top-down. Only scientific research will prove if our mental activity is merely a distributed pattern of neural activation or if it has to be modelled as the neural embodiment of syntactic rules processing representations. Actually, current cognitive psychology, which attempts to discover the syntactic rules or procedures that process representations without overly resorting to folk psychology, has provided the best generalizations to explain social action to date.

The second critique is towards the *holistic illusion*. Theories are still present in the methodologies of social sciences that support an autonomous and separate level of social phenomena. Structuralism and social functionalism are two examples. The first consideration is that if we want to reduce something, the reducible phenomenon must be real. And the separate ontology of social phenomena is, in my opinion, more dubious than that of water compared to its molecular structure. If this is true, concepts and language about social phenomena are only, and not always, useful elliptical metaphor referring to group of individuals and the explanations of social phenomena are the explanations of the behaviour of these groups of individuals. As in the previous eliminative programme about mind-brain identity, there is no reduction but only the elimination of one non-existent level by the other. The social dimension is quite dubious even from a conceptual point of view. Often the social concepts only have an *intensional* life, in other words they only live in the heads of social scientists and they lack any *extensional* reference. In other cases their extension is definable only with reference to individuals and their behaviour. Teleological social *functionalist* explanations can always be interpreted causally as individual actions reinforced by positive feedback from the environment to the mental representations and decision-making processes of the agent. Another holistic remark tries to show that social phenomena are emergent and are not reducible to individual cognition. For example, unintended consequences of action or social learning cannot be explained in terms of cognitive mechanisms of action. At first glance these phenomena seem to have something that goes beyond individual cognition. In the chapter it will be shown that this is not the case.

The third chapter "*Cognition and Rationality of Beliefs in Social Sciences*" analyzes one side of rationality neglected by neoclassical economy, that of the

rationality of beliefs. The theoretical focus has mainly been concentrated over the past few years in analyzing the side of the *formal rationality* of preferences. One question comes naturally to mind: why have researchers concentrated mainly on the formal aspects of rationality, and on preferences in particular, neglecting to analyze the *substantial aspects of rationality*, in particular the extremely important question of beliefs? The most probable response might arise from the fact that the theoretical elaboration of the concept of rationality has above all been provided by economists, who are clearly interested mainly in the formal relationship between preferences and consumer choice, and only secondarily in the question of contents and the foundation of beliefs and expectations.

Economists have introduced two key meanings for rationality. There is a *broader definition of rationality*. It is felt that an actor acts rationally, for example, when he has a utility function whose arguments are defined as alternative uses of the resources with which he is endowed. The quantity of these resources are seen as constraints to the possible choices available to the decision-maker, so that rational behaviour consists, in terms of solving a problem of bounded maximisation, in determining the whole panoply of resources to dedicate to each of the possible uses. The second definition of rationality is a *narrow* one, which has replaced the broader definition in many descriptive contexts. Rationality is seen as the maximisation of expected utility, which is instead based on strong *a priori* psychological assumptions. It assumes preferences as being given and coherent, a corpus of beliefs corresponding to a true description of the world, and an unlimited decisional power for the decision-maker. Therefore, there is no need to draw a distinction between the real world and the decision-maker's perception of it, given that he has a true representation of the world. Contrary to these assumptions, if instead we accept the empirically confirmed finding on the limited capacity of knowledge and the computational power of the human decision-maker, then we must distinguish between the real world and the representations of it formed by the decision-maker. In other words, we must elaborate an empirical theory of the cognitive processes that lead to the decision. This will therefore include the perception, representation and memorization of beliefs in the world and the deductive and probabilistic reasoning on the factual base it produces. This is what Simon defines as *procedural rationality*. The neoclassical economic approach to rationality has instead hampered the development of effective methods to investigate the processes through which selected aspects of reality are perceived, or how a representation of the situation of choice is formed or how inferential processes are responsible for particular conclusions based on the previous representation. It is clear from various examples given by Simon (1986, pp. 29–38) that many explanations of neoclassical economics taken with the ad hoc addition of auxiliary assumptions could have been reached using the postulate of limited procedural rationality without the assumption of the maximisation of utility. For example, the neoclassical theory, with or without resorting to the assumption of rational expectations, cannot explain the phenomenon of the economic cycle without resorting to auxiliary irrational assumptions, like that of *monetary illusion*, which clearly correspond to a deviation from objective rationality.

At this point we could characterise the rationality model in three successive stages, each featuring a specific type of rationality. The informative process gives the agent a range of more or less accurate evidential data (*perceptive rationality*), which are represented and memorised (*rationality of beliefs*); using logical and probabilistic forms of reasoning, the decisional process infers the possible action from the information (*decisional rationality*); and the implementation processes transform, with more or less accurate results, the potential action into real action (*rationality of action*). Decisional rationality can, in turn, be broken down into two main forms of rationality: *cognitive rationality*, linked to processing the available data in order to define the agent's expectations about himself and the surrounding environment, and *instrumental rationality*, which, based on these expectations, tries to select the most appropriate action. Perceptive and decisional rationality correspond to Simon's procedural rationality.

To my way of thinking, Simon's normative solution is too biased towards instrumental rationality and fails to focus sufficiently on the problem of rationality of beliefs, the accuracy of representing the world (and also of representing the problem of choice) which forms the information base for heuristic inference. This inference will be more or less effective depending on whether the representation of reality is more or less correct, more or less significant and not banal. The rationality of representing informative inputs presents problems of an epistemological nature which are still far from being resolved using a cognitive and simulative approach. An epistemological solution to these problems might be the *internalist* that sustains that the rationality and reliability of our belief formation processes is guaranteed *a priori* by ourselves and that no empirical and experimental study would be able to question the rationality of these processes. If anything, they could only describe them. Quine's naturalization program of epistemology (1985) moves in this direction. Instead of asking how we ought to go about forming our beliefs, we should ask how do we actually go about it.

Perception is a central theme of this program. One of the standard approaches in the psychology of perception is based on pattern recognition. People recognize the presentation of a particular object as an example of a certain pattern. Perception output implies a classification of the stimulus. Perception is ultimately made up of two kinds of elaboration: bottom-up elaboration, in which information flows from small perceptive inputs to larger units made up of those inputs, and top-down elaboration, in which background beliefs influence the interpretation of the most elementary perceptive units. For example visual control of action is mediated by cortical pathways that are different from those involved in visual control of the perception. In other words, when we merely see an object, such as chair, we process differently that if we intend also to pick up the object. Usually we perceive the object holistically. But if we intend to act on them, we perceive them more analytically so that we can act in an effective way (Ganel and Goodale 2003). Moreover, a trade-off phenomenon between rapidity and reliability of perception is evident. Strong emotions, such as desires and fears, generally related to primary needs, lead to an improvement in perception rapidity to the detriment of reliability.

The corpus of beliefs, the factual foundation of rationality, depends on memory. The first consideration to make concerns which database is used in the inference. Various experiments, as well as everyday observation, clearly show that the factual database used often corresponds only to a part of the beliefs available in long-term memory and useful for inferences (Sternberg 2009). People cannot gain access to a significant part of their knowledge and consequently the resulting inferences are generally wrong. Sometimes the individual cannot connect all elements, useful for inference, existing in his memory. Associated to memory we find the irrational phenomenon of perseverance in the belief, carefully studied by Nisbett and Ross (1980). People are inclined to preserve a belief even after it has been proved false by new evidential data. There is also another characteristic of memory which goes against the rational principle of revision of beliefs in the face of new informational data. According to psychologists, long-term memory is not a blackboard from which propositions can be wiped out on the basis of new evidence. On the contrary, there seems to be no real loss of informational material from memory unless as a result of physical damage. Every piece of information memorised, and every belief acquired, is stored in memory and cannot be erased even after it has been proved false. If information cannot be erased from memory, it will contain contradictions and time structures.

Therefore how can we establish a sound rationality of beliefs that is the factual premise of our decision, if the memory and perception generate so many biases and distortions? The principal condition of rationality of beliefs is that the factual base, the corpus of beliefs, is founded, and corresponds, as reliably as possible, to the real world. Any particular method of gathering information yields putative results because of its own peculiarities, its biases and distortions. *Triangulation*, that is using multiple procedures, methods or assumptions to get at the same putative object, trait, or regularity serves to correct such biases in order to know the real properties of the phenomenon being studied. Truth as correspondence to reality can be well expressed by the following metaphor used by Alvin Goldman (1986): unlike the metaphor of truth as a mirror of pre categorized nature, truth can be seen as a garment that is tailor-made to fit reality using a variety of instruments. The styles, and also the categories, produced by man, may vary and differ, what is important is that they achieve the result of “clothing” reality. Triangulation would entail using all the decision-maker’s cognitive, heuristic and methodological resources, critically and cross-referenced, in line with the techniques identified by cognitive science. They would be used to construct a corpus of beliefs, a factual base that has a reliability and likelihood that has been produced and verified independently by different cognitive processes.

Chapter 4 “*Brain, Mind, and Social Action*” deals with how the brain research can contribute to the methodology of social sciences.

One of the most important concerns of contemporary philosophy of social sciences is the relationship between the researcher and human behavior, specifically the modality employed by the social researcher to understand or predict the actions of a social agent through the identification or simulation of her mental states. Cognitive identification and simulation is the necessary premise to understand an

action and generalize it into an ideal-type representing aggregate social behavior or a social phenomenon.

In studying social action, the researcher tries to reconstruct the mental process that led or could lead the agent to act in a certain way. There are various candidates for her mindreading, which may be conducted with one of three main methods: through simulation by the researcher of the target's mental states; through theoretical inference of the target's mental states based on a folk psychology theory; through inference of the target's mental states based on a specialist scientific theory. Through mindreading, the researcher aims to identify the mental states directly responsible for an action. So his attention will focus largely on propositional attitudes like beliefs, desires, decisions, plans, hopes. Mindreading of these mental states typically takes place at conscious level with a certain degree of willpower (Goldman 2006, p. 147). The reader may interrupt, slow down or speed up the reading. He can decide which mental states to include in or exclude from the reading process. He has a partially clear conscious idea of the various steps in the reading process. In the relationship between mindreader and target, however, the target's mental states are also read at another level. This level corresponds to emotional empathy (or with a new term *mindfeeling*) reading of sensations like feelings and pain and of emotions like disgust and anger. The characteristics of this low-level mindreading (Goldman 2006) differ from those of the first type of mindreading. It is an automatic reading, independent of the will. The reading is often not conscious, although subsequently it may become so when we become aware of its effect. We cannot govern the process.

What principle does the researcher adopt when mindreading and processing the target's choice of action? In trying to make sense of his target, the attributor "will try for a theory that finds him consistent, a believer of truths, and a lover of the good" (Davidson 1980, p. 253). According to Davidson and Dennett, mindreading is possible if the mental states are identified on the basis of a priori normative principles. Without such principles, reconstruction of the reasons for the target's action is impossible. Likewise, some contributions from social psychology (Hamilton and Sherman 1996) and pragmatics of language (Grice 1989) highlight attributors' tendency to adopt principles of consistency, wholeness of information and truth in understanding or predicting others' actions. In contrast to normative a priori attribution we have the possibility of an empirical a posteriori attribution, which aims during the mindreading process to identify the principles governing mental state attribution and action prediction. Quine despaired of the possibility that we can infer the specific content of the mental states of a target. The only way is to bootstrap from our mental states and to proceed by empathetic imaginative projection (McGee 2005). To do this, the social attributor must avoid projecting his own normative principles and concentrate on the target's life, history, reference context and empirical data, using this inductive knowledge and active imagination to attribute a posteriori the principles used by the target.

In conducting empirical research, the social scientist, like every other scientist, is however generally conditioned by the theories of his field and his background knowledge. According to Theory Theory (TT) (Premack and Woodruff 1978),

attribution of other people's mental states is possible only through construction and development of a theory. Our mental states and others' mental states are unobservables empirically linked, in the first case, with sensorial input and, in the second, with external behavior and action, and consequently any attribution is of a theoretical nature. On the basis of these theoretical entities, beginning in infancy we build our theoretical assumptions on third person's mental activity and first person's mental activity. Thus, every time we mindread a target, we apply a "Hempel model" where our theory, generally a more or less complex version of folk psychology, represents the major premise of the explanans. By analogy this deductive hypothetical activity also takes place in social research. In order to identify the causes of a social agent's action, the mindreading on the various individuals will be guided deductively by the folk theory and its concepts. The mindreading will lead to the development of the scientific hypothesis under investigation.

As Goldman has convincingly shown (2006), various experimental cognitive and neuroscientific findings appear to diminish the theoretical importance of TT in mental attribution. One of the cornerstones of TT, the theoretical aspect of mental states, has been questioned by a series of studies on first person attribution. There is asymmetry between the access to third person and first person mental states. The access to first person mental states resembles the visual perception. The representation of mental types is direct 'perception-like recognition process in which a given occurring token is mapped into mental category selected from a relatively smallish number of types' (Goldman 2006, p. 253). The representation of mental content instead utilizes the redeployment (and in the case of visual format the translation from visual code to belief code) of the content already present in mind to produce the content assignment contained in the metarepresentation. (Goldman 2006, p. 254). This model of introspective self-attribution supporting a strong asymmetry between first person and third person attribution seems to be supported by neuroscientific data. Furthermore, social researchers know that self-reflection is the source of the main intuitions regarding an hypothesis as well as its first test-bed. If the researcher is free to simulate the relationship between mental states and action directly in his own mind without reference to a folk theory, he will have a better chance to catch genuine features of the causes of the social action. A reliable mindreading of the target's mental states requires the researcher to put aside his theoretical models and idiosyncratic positions and simulate those of the target without distortions. The greater the match between the two states, the greater the cognitive value of mindreading. As we have seen, TT rejects the possibility of theory-free reading. Simulation theory, on the other hand, regards it as one of its distinguishing characteristics. This is not to say there are no egocentric tendencies nor that the mental state content is that of the target. Specifically, there appears to be evidence that mindreading in everyday life has a tendency to make egocentric attributions with regard to knowledge, preferences, feelings. Behavioral economics offers extensive literature on this point. In attributing propositional content, the attributor necessarily takes his personal conceptual and ontological constructs as a basis. Even if the way he builds the representation and derives the inference tends to

correspond with that of the target, the building blocks are those of the mindreader. In any case the neuroscience findings seem to indicate that a specific area of the brain is responsible for self-perspective inhibition, a vital function if the mindreader is to quarantine his egocentric projective tendencies. When the mindreader is a social scientist, a double effort is required: to quarantine egocentrism and to inhibit the interpretative role of the scientist's professional knowledge, in particular of the social theory for which he is performing the mindreading. The scientist may be unable to achieve this dual inhibition by himself and may require external aids to conduct a critique of his personal viewpoint in order to quarantine it. This could take the form of intersubjective comparisons with other researchers or, better still, with non-experts using the three-step mindreading procedure proposed by Goldman (2006, p. 170).

The main approaches in social sciences favor mindreading at the level of propositional attitudes. Understanding or predicting an action requires mindreading of the mental states – beliefs, desires and intentions – responsible for the action. This is achieved through conscious, intentional metarepresentation of the target's mental states by the attributor. Forms of automatic, unconscious reading of intentional mental states are not contemplated nor does reading of emotions and sensation play an important part. This is the thesis shared by the normative approaches in social sciences and advocated by TT. Recent neuroscientific research, however, appears to show otherwise. Recent studies on a human cortical network composed of the rostral part of the inferior parietal lobule and the caudal sector of the inferior frontal gyrus plus the adjacent part of the premotor cortex (Rizzolatti et al. 2001) found a type of neuron, the *mirror neuron*, that seems to intermediate automatic unconscious attribution of intentional content to a third person observed in action.

When we see *transitive* hand/arm gestures (involving an object, such as picking up a cup) or *intransitive* hand/arm gestures (not involving an object, such as a dance step), there is an activation of part of the same motor circuits that are recruited when we ourselves perform that action. The mirror neuron system encodes not only the gesture under observation, but also the intention with which it is performed, as demonstrated by recent research by Iacoboni et al. (2005). Additionally, other studies with fMRI found a functional connection between the areas in the mirror neurons, the insula and the emotional areas of the limbic system, in particular the amygdala (Carr et al. 2003). The mirror neurons are activated when we see other people expressing emotions as if we ourselves were making those facial expressions. The activated neurons also transmit signals, via the insula, to the emotional cerebral centers of the limbic system, so that we ourselves experience what the person we are watching is experiencing (Iacoboni 2008). Both types of attribution are simulative processes, albeit a type of automatic and unconscious embodied simulation.

Should this hypothesis be confirmed by future research, it will have a considerable impact on understanding of social action. Embodied simulation of mirror neuron theory is creating difficulties not only for the normative approach, already undermined by the weakening of TT and the other approaches positing theoretical mindreading, but also for the pure cognitive approach. Cognitive simulative action

mindreading often seems to be overridden by automatic, unconscious attribution of intentional content. And this is not just a question of attribution of “a motoric plan” (Gallese and Goldman 1998, p. 498) because the “real attributor does not go back to a distal goal or set of beliefs” (Gallese and Goldman 1998, p. 498), as mirror neuron researchers themselves believed a few years ago. On the contrary, as recent research by Iacoboni et al. (2005) has found, the real attributor does indeed go back to a distal goal or set of beliefs! Moreover, the emphatic resonance might penetrate action understanding in a forceful manner. It might add emotional overtones to the context in which intentional content is automatically attributed to the observed action. The visceromotor simulation of the emotional expression of the observed subject might enhance the somato-motor simulation of the observed action, providing a better focus on the internal reasons for the action. The hermeneutic approach in social sciences seems to be the only approach to anticipate and be consistent with the results of research on mirror neuron theory embodied simulation, in particular because of the importance it attaches to emotional and affective simulation and to the corporeality of the simulation.

Part II of the volume “*Cognitive Economics*” analyzes the features of *cognitive economics* born through the application of *methodological cognitivism* to theory of economic action.

The first chapter “*Developing Simon’s Bounded Rationality*” analyzes the implications of Simon’s bounded rationality theory in economics.

Herbert Simon is the father of the empirically based microeconomics. His economic theory is founded on a new concept of economic rationality. Herbert Simon’s contribution to the theory of economic rationality can be characterized by one *pars destruens* and one *part costruens*. The first part is the attack to the neoclassical Olympic rationality. The second is the proposal of an empirically based bounded rationality theory. While the first seems justified theoretically and empirically the second shows some serious flaws.

In science there are two basic ways to control a theoretical hypothesis: (a) indirectly, by upholding the general propositions to which the hypothesis is deductively connected; (b) directly, through the control of factual, singular propositions that can be derived from the hypothesis, in the form of initial conditions. In posing the problem of controlling the theoretical hypothesis of the rational maximizing actor in neoclassical economics we can refer to either way.

To which general propositions is the economic actor hypothesis connected in neoclassical economics? According to Simon (1987, p. 26) this model of rational actor is mainly connected to the following hypotheses:

1. His beliefs about aims and values are given and not liable to change in time and through experience.
2. His beliefs are internally coherent.
3. The agent is capable of an objective description of the world.
4. His abilities to elaborate data to define his expectations, that is, respectively, his probabilistic and deductive reasoning, are not limited.

We could express these properties otherwise by saying that, in the neoclassical economic actor, perceptive rationality and rationality of beliefs – the rationality which is assumed in the representations of informational data – and decisional rationality – the rationality which is assumed in inferential activities which lead from data to decisions – are non-limited (from the point of view of some normative canons). Neoclassical *perceptive rationality* and *rationality of beliefs* presupposes an objective representation of the world, in the form of coherently organized true beliefs. Empirical control of this hypothesis has been effected mainly through cognitive study of perception and memory mechanisms and of the codes of representation of informational data. As I have shown before up to now these controls prove that the representation of informational data is often unreliable and incoherent. Top-down elaboration of perceptive stimuli often tends to add something which was not present in the stimulus itself: some internal constructive process mediates between the entry stimulus and the perceptive result. This can lead to an improvement or to a decline in the reliability and truth of the perception, depending on the kind of perception and on individual mnemonic patterns. Various experiments, as well as everyday observation, clearly show that the factual data base used in inference often corresponds only to a part of the beliefs available in long term memory and useful for inferences. People can't gain access to a significant part of their knowledge and consequently the resulting inferences are generally wrong. Sometimes the individual cannot connect all elements, useful for inference, existing in his memory. People are inclined to preserve a belief even after it has been proved false by new evidence. The reason of this perseverance can be found in the emotional refusal of new beliefs, deemed unsatisfactory, and in the search for factual validation of old beliefs through the retrieval of supporting information from memory. Moreover every piece of information memorized, and every belief acquired, is stored in memory and cannot be erased even after it has been proved false. If information material cannot be erased from memory, it will contain contradictions and time structures.

Serious cognitive constraints to the "Olympian" pretences of neoclassical rationality have also been empirically brought to attention in regard to *decisional rationality*. In elaborating the available data to define expectations about environment and agent and to select, on the basis of these expectations, the most appropriate action, people seem to deviate from the rules underlying the neoclassical rational agent. This is evident in many studies of *probabilistic reasoning*, which have shown that man forms estimates about the likelihood of future events, assigns numbers and percentages, combines probabilities and values in a way which does not conform to the theory of probability. The selection of information deemed relevant for decisional purposes is not carried out through an exhaustive examination at mnemonic level of all relevant information (Tversky and Kahneman 1973). Man tends to select examples of large classes rather than of small ones, even if they are just as relevant in the decisional context (heuristic of availability). Another tendency discovered by Tversky and Kahneman is the propensity to give counter-normative judgements according to the degree to which the salient characteristics of an object or person are representative of or similar to characteristics conceived as

peculiar to some category. Some experiments have shown that subjects underestimate the effects of new evidence and that this underestimate is reflected in their evaluation of the subsequent probability, evaluated as lower than predicted by Bayesian theorem. This behaviour has been called conservative by Edwards (1968). On the other hand, subjects have more often been found to ignore completely, in certain situations, previous probability.

A decision is generally elaborated by combining probabilistic and *deductive reasoning*. One implicit logical form which can often be identified in the argument at the basis of inferences is the syllogism. In it premises and conclusion can have various forms, among them universal, particular, probabilistic or hypothetical propositions, so that we can speak of categorical syllogisms, statistical syllogisms and quasi-syllogisms. Empirical results of experiments on syllogistic reasoning have shown very low levels of performance. One of the most important inference rules that has been studied till now is the *modus ponens* of material implication. It rules that given the proposition “if A then B”, and given also A, then one can validly infer B. Most people find little difficulty in accepting arguments based on the *modus ponens*, but often have problems with another inference rule known as *modus tollens*. This rule dictates that, given the proposition “if A then B”, and given also the fact that B is false, we can infer that A is false. Both these inference rules seem quite obvious, but people find some difficulty in applying them. The difficulty arises from the inability to behave in a way which fits with the correct interpretation of the rules, and from the inclination to draw conclusions which are not justified.

To conclude, empirical control of the propositions at the basis of the model of rational actors in neoclassical economics appears to falsify them. Common man’s inferential and decisional performances diverge from the prescriptions of the hypotheses underlying maximizing rationality. This reason alone would be enough to reject the hypothesis itself.

For the sake of methodological completeness one could also control the factual predictions inferred from the model of neoclassical rationality. If the predictions too were falsified by empirical data of an economic kind, one would have another strong argument against preserving the hypothesis of maximizing rationality. There are two main ways of controlling the factual consequences of an economic theory: through observation in artificial experiments or through historical recording in the so-called natural experiments. From a methodological point of view economists are rather doubtful about whether *artificial experiments* can be considered as a reliable testing ground for the rational actor theory. There are three specific constraints for an experiment to be acceptable by economists (Hogarth and Reder 1987, pp. 11–13):

1. Subjects in the experiment must have experience as maximizing actors in the specific market sector.
2. Subjects must be appropriately motivated so that rewards are a progressive function of the correctness of their answers.
3. Experimental settings must correspond with a context in which competition market forces are active.

However, some experiments have been carried out in recent years to reproduce the conditions of choice outlined by economists. Results are contradictory. In some experiments which aimed at reproducing motivational patterns in relation to the correctness of answers, results have been counter-normative. Thaler (1987) and Kahneman and Tversky (1987) have quoted studies in which an inverse relation between incentives and rational behaviour has emerged. Other studies, conducted on experts in experimental realistic settings, have highlighted a proportion of errors analogous to the one of non-expert groups (Eddy 1982). In artificial experiments the possibility of selecting and isolating the most relevant decisional variables allows, in principle, direct control of the maximizing rationality hypothesis. Verifying the rational choice hypothesis in the so-called *natural experiments* is a different matter. Economic science has a pre-eminently deductive nature. Given the general framework of the rational choice hypothesis – in its enlarged version of constrained maximization of the utility function or in the restricted version of maximization of expected utility – economists are interested in extending the applicable domain of the hypothesis. This is achieved through various conventional stratagems, but chiefly through an abundant use of suitable, and often *ad hoc*, auxiliary assumptions, which protect the rational choice hypothesis from falsifications, without increasing the empirical content of the theory.

To conclude, both the control of the general propositions at the basis of the model of rational actor and the control of the factual consequences of this theory seem negative. The successful explanation of the economic behaviour doesn't rely only on the neoclassical theory of rational actor plus the initial conditions but needs the *post hoc* addition of new assumptions. These assumptions, in many cases, have the form of empirical psychological laws about economic decision making. These laws often add empirical content to the theory, therefore their introduction may be considered non *ad hoc* and then accepted. But in many cases they rob the neoclassical theory of rational actor of its predictive primacy. The “maximizing” theory itself becomes an auxiliary assumption that may be substituted by the “satisficing” one without any loss of explicative power. In other cases the *post hoc* assumption, doesn't add any empirical content nor function as a semantic device to define the situation. These are typical *ad hoc* adjustments that show the inadequacy of the theory.

The *pars costruens* of Simon is the proposal of an empirically based bounded rationality theory. The first consideration is to be made on the ontology of the economic actor concept. Does it refer to the general characteristics of the agent, or does it simply single out the functions of the actor who is present in economic contexts? Or, to put it another way, does it describe the real man or only a part of him specialising in economic interaction? If we think back to two of the founding fathers of economic theory, Adam Smith and John Stuart Mill, the difference is clear. In Smith's view (1776), man's self interest conduct, the object of economic study, was not aimed solely at increasing his pecuniary wealth, but rather at sentiments such as honour, ambition, social esteem, love of dominion and so on – themes of psychological study; Mill (1848), instead, saw it as a hypothetical exemplification isolating a select set of the functions, such as the maximisation of wellbeing and the desire for leisure time, which underpin economic behaviour.