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Philosophy of Science in Italy

It would be a next to impossible task that of giving a complete and satisfying description of what happened in Italian philosophy of science in the past 50 years or so. The task would be impossible not only for the time span, but also for the variety of issues and problems Italian philosophers have dealt with, which cannot be considered in details into the length of this paper.

In this paper, hence, I will consider the main movements and schools that have been dominant in Italy from the 70's onward, with particular emphasis to the interests toward the empirical sciences and its foundational issues. Given the level of generality I have chosen, I will venture in mentioning people and places in a very limited way, where further research can help to individuate further details.

Setting the stage

To set the stage for considering the development that philosophy of science had in Italy, it is worthwhile to consider two main tendencies, present in the early stages of the Italian reflection on science. One was *critical rationalism* and the other was *operationalism*.

A number of Italian philosophers, sometimes first or second generations full professors in the discipline, were followers of the so called School of Milan and they were scholars and pupils of Ludovico Geymonat, who held the first chair in philosophy of science, established immediately after the second world war in Milan. They were thinking of science as the product of interaction between empirical results and the theoretical vocabulary. In this sense, Geymonat was initially quite close to the neopositivist. Lately, he considered the relations between science and society, under the pressure of the Italian Marxist movement. However, the pivotal role of reason and an

attitude close to Enlightenment has always been present in his thought, which have been elaborated by a number of philosophers and logicians that had positions in Milan, as Giulio Giorello, Cagliari, as Silvano Tagliagambe, Genoa, as Evandro Agazzi. Reflections on the history of science and the political role of science were pursued by Enrico Bellone and Salvatore Veca. Also logic was particularly developed in that school thanks to people such as Marco Mondadori, Corrado Mangione and many others. (Mugnai, Minati, etc.).

An interesting twist to the neopositivist attitude was the operationalist one, as it has been done by people in Genoa, as Evandro Agazzi, and in Rome, mainly Vittorio Somenzi. People in Genoa considered science as crucially based on both an appeal to objectivity and one to a careful methodology. Science is thought to be objective in that in its endeavour, it can attain to the objects of its inquiry, not in themselves, rather through intersubjective verifiable operations. These operations merge together methodological criteria and ontological goals. These operations, were measurements, experiments, controlled data analysis, were thus bringing a realist view on the entities, though mediated thanks to these means. The way in which such operations were enforced in scientific theories was by means of specific sets of predicates, those that gave the theory its specificity and that were devoted to capture the nature of its objects of inquiry.

Operationalism has been the source of Somenzi's reflections on science. Following physicist Bridgman, Somenzi, a physicist himself, was guided by the idea that science cannot be given but in procedures and by means of interventions on the objects it investigates. In a way, realism was not, strictly speaking, an issue for him, because it was, and still is, more of a concern for philosophy than it is for science. Therefore, thus anticipating many of the discussion now present in the interventionist view of causation by Woodward, inasmuch science investigates properties and relations in the natural world it does so by acting and intervening on that natural world itself. If philosophy wants to keep track of the way in which science gets to its results, it should better not confuse what science licenses us to say and what philosophy argues it does.
Somenzi has played an influential role also because it was one of the first scholars in introducing reflections on the philosophical importance of artificial intelligence and neurosciences.
Among the most important followers of Somenzi, it has to be considered Roberto Cordeschi.

Working on such issues as the birth and developments of cybernetics and artificial intelligence, Cordeschi has considered the theoretical role played by figures as Craik, Ross, Ashby, and Nobel laureate Simon. In the aim of reconstructing the heydays of artificial intelligence, Cordeschi has been able to trace down the source of many key concepts of present day work in cognitive science as well, in particular that of representation. Cordeschi has argued that the programs of information processing and artificial intelligence were theories on the way in which our cognitive systems work. So, the « discovery of the artificial », to mention his most known book, was actually the discovery of a number of conceptual tools for establishing a theory of the mind. Together with Somenzi, he was definitively one of the most important figures in the diffusion of philosophy of mind in Italy.

Coming to the present days.

One aspect that may help to depict Italian philosophy of science is the role that the *Società Italiana di Logica e Filosofia della Scienza (Italian Society for Logic and Philosophy of Science* – SILFS) has had for establishing and developing this field of inquiry in Italy. Founded in 1952, the society gathered basically all the professional philosophers of science that were operating in Italy. It organized general conferences every three years, with dozens of scholars attending them and many invited professors from abroad. The society, on the one side, had the role of aggregating people and their interests toward many and important issues in the philosophy of science; on the other side, the society let Italian scholars to confront themselves with philosophers coming from outside, facilitating in this way a process of internationalization for the Italian philosophical community.

The proceedings of the conferences were published with fair regularity and had a good circulation. By looking at the SILFS proceedings' table of contents (see references) it is clear which have been the main interests in Italian philosophy of science. They spanned from philosophy of physics and the logic behind physics, to interests in logic, initially pure and then more and more applied to different contexts, and slightly moved to consider other empirical disciplines. Such changes has been witnessed by the more international role Italian philosophy of science assumed. An important role was played by some presidents of the Society as Maria Luisa Dalla Chiara, Carlo Cellucci, and Michele Abrusci.

The acknowledgement of the international status of Italian philosophy of science was also witnessed by a colloquium held in Boston, back in the late 70's led by Dalla Chiara and Cellucci. Hosted by the Center for Philosophy and History of Science in Boston, Boston University, the colloquium proceedings were published in the Boston Studies for the Philosophy of Science series in 1980. Recently, in 2007, a new colloquium on Philosophy of Science in Italy gathered another group of Italian scholars, led by Gilberto Corbellini, but no proceedings were published. The differences among the talks and papers delivered in the two colloquia reflect the differences mentioned with respect to the proceedings. While in 1980 most of the papers were either on logic or on the logical and theoretical foundation of physics, with some interconnection between these two fields (logic for physics), in 2007, the philosophical foundations and the problems raised by a host of empirical theories were considered. The theories and disciplines considered were ranging from physics to biology, from artificial intelligence to cognitive science, from medicine to the social sciences. I think we should consider this passage as the main hallmark of recent Italian philosophy of science.

If we turn our attention back to the '60ies and '70ies, one prominent interest has been in the methodology of science. Many people, in the area of Milan, Florence, Pisa, Genoa, Padua, Bologna and Ferrara, have been working on the topics discussed by authors such as Popper, Lakatos, Toulmin, Feyerabend and Musgrave, in order to determine haw can scientific method be characterized, as opposed to non-scientific methods, and whether we can assess it in most of the experimental practices. Two main strands can be isolated : one, closer to the theses by Popper, were recognizing the presence of such a method and developing it along realist or instrumentalist lines, by authors such as Marcello Pera, a pupil of Francesco Barone, and more recently by Marco Buzzoni, Paolo Aldo Rossi, Michele Marsonet, Fabio Minazzi and others. Another strand, particularly developed by Giulio Giorello, was instead closer to the anti-methodological view upheld by Feyerabend, arguing that it is not possible, given its multiple and heterogeneous nature, to ascribe to science something like a common method. This discussion had some feedback in Rome as well, but its impact was somehow more limited.

As we were saying, an important interest in Italian philosophy of science has been philosophy of physics and similar hard sciences. The philosophical foundation of theories such as general and special relativity, quantum-mechanics, and the relationships with philosophical theses such as determinism and indeterminism, has been at the centre of the stage for many philosophers in Florence, Padua, Rome, Urbino, Cagliari, Bologna, and lately Milan and Macerata. One issue

was the logical foundations of quantum mechanics, a problem that has led to the development of special logical tools for handling problems related to the consistency of quantum mechanics vis-à-vis classical logic. These were developed by Dalla Chiara, Giuliano Toraldo di Francia, Gino Tarozzi, Vincenzo Fano. With respect to logic, particularly strong in the area of Florence, one must consider the works by Ettore Casari, Cellucci, Abrusci, Andrea Cantini, Giovanna Corsi, Pierluigi Minari, Sergio Galvan, Sergio Bernini, and Roberto Giuntini, this last one has established a strong school of logic in Cagliari, with Francesco Paoli and many others. It should also be mentioned the area of history of logic where Massimo Mugnai and Mirella Capozzi have done important research, Leibniz and Kant respectively.

On the relation between physics and logic, these philosophers have been working extensively, demonstrating significant logical theorems. In general, many issue relating logic and deduction, also in the case of philosophy of science, have been considered among scholars in Ferrara, as Marcello D'Agostino, and Chieti, as Mario Piazza.

The issue of the symmetry in physics and the philosophical problems raised by this property and by its breaking has been of interest for Elena Castellani, as was the significance of Bell's theorem on non local effects and its relation to the so-called Einsten Podolsky Rosen Argument, for Federico Laudisa.

Another important thread of research was on temporal becoming and on the bearings that the theory of general relativity has on issue such as determinism and, ultimately, freedom. Such a theme was developed by people mostly from Rome, in particular Mauro Dorato, and lately Matteo Morganti. It is interesting to note the increasing attention to the impact that philosophy of science was, and still is, having on metaphysical themes. It must be noticed, in this respect, that following the neopositivist tradition, for instance by people in Bologna such as Alberto Pasquinelli, philosophy of science has been for many years disconnected from metaphysics, an approach that has characterized this line of research also in many other different countries (UK and the USA). With the resurgence of metaphysical interests in the 70's and the relaxation of the neopositivist standards, a fruitful interaction between these two fields has emerged, and Italy was part of this movement. A case in point has been the renewed interests in themes such as causation and probability. The focus of many scholars, such as Maria Carla Galavotti, has been the work of Italian Scholar De Finetti and then Ramsey, and the impact the notion of probability had on the establishing a proper analysis of causal relations, where some of these issues have been deeply elaborated by Roberto Festa and Vincenzo Crupi as well.

Another interesting thread was the linguistic form of scientific theories, disentangling the role of logical form in inferences from that of giving information about the content of the theory itself, Giorgio Sandri in Bologna. The problem of logical form and inferences, in particular counterfactuals, has been at the center of the interest also for other scholars in Siena, as Claudio Pizzi, and has been lately developed in modern terms with researches on abduction from people from Pavia, as Lorenzo Magnani. Also philosophical logic, and its relation to language and linguistics, has been pursued by Italian scholars in philosophy of science. In particular, one may want to consider the works by Enrico Moriconi, Pierdaniele Giaretta, Cesare Cozzo, Claudia Casadio, Alberto Mura, Hykel Hosni, Gianluigi Oliveri and Andrea Iacona.

A further and different thread, on the philosophical problems raised by theoretical and empirical biology, was followed by people from Rome –as Massimo Stanzione, Elena Gagliasso and Barbara Continenza, Padua with Telmo Pievani, Massimiliano Carrara (with interests in metaphysics as well) and Giovanni Boniolo, who begun with issues concerning physics and then moved to theoretical biology by considering the dispensability of the notion of information as a toll for better understanding biological phenomena.

The role and development of the science of the artificial, from artificial intelligence to cognitive science in general, has draw the interest of a group of people in Naples (as Giuseppe Tratteur, Settimo Termini and Guglielmo Tamburrini), with connections in Rome, Teresa Numerico, and Salerno, Marcello Frixione and Milan, Viola Schiaffonati. These people were considering both the theoretical role of these disciplines, from the standpoint of philosophy of mind and semantics, and its social and practical role, as revealed by ethical and practical issues raised by the widespread use of technological artefacts. On the one side, a number of people investigated issues ranging from heuristics, intelligence and even consciousness in machines while other faced the referential and semantics competence in terms of machine's learning. Others philosophers tackled the nature of ethical problems connected with having robots interacting with people and in general the problems raised by human-machine interaction and modelling.

Also the intersection between philosophy of science and philosophy of mind has received an increasing attention from the late 80ies of the past century to present days. The leading role has been played by Michele Di Francesco and Sandro Nannini, and this field was explored by Alberto Voltolini, Diego Marconi, Simone Gozzano, Antonella Corradini, Alessio Plebe, Massimo Marraffa, Fabio Bacchini, Pietro Perconti. Researches with strong interaction with neurosciences has been pursued by Corrado Sinigaglia in Milan.

A different but fruitful interpretation of the problems in philosophy of science was its interaction with the social science. A number of scholars, led by Dario Antiseri and such as Angelo M. Petroni, Lorenzo Infantino, Riccardo Viale, Enzo Di Nuoscio, Antonio Rainone, Albertina Oliverio and Simonetta Morini have investigated the relation between philosophy of science and the social sciences in general, insisting on the role of libertarianism in science as a precondition for the proper development of free scientific research and on the relation between the various methods and forms of explanations and rationality. The relations between philosophy and economics have been investigated by Pierluigi Barrotta, Matteo Motterlini, Gianluca Bocchi and Mauro Ceruti, the last two both former pupils of Geymonat.

To sum up, philosophy of science is an interesting field in Italian philosophy. It has paid the price of Italian philosophical scepticism toward science, which was promoted by important figures such as Croce and Gentile in the first half of the past century. Such price has been partially paid by an active group of logicians and philosophers that have moved from physics to other empirical disciplines. Nowadays, we can consider Italian philosophy of science well integrated in the international community. A case in point, for instance, can be made by noticing that Mauro Dorato is co-editor in chief of the *European Journal for Philosophy of Science*, a journal published under the auspices of the *European Society for philosophy of science*. Also, the number of papers published by Italian philosophers on international journal is increasing. A complete and accurate history of this field in Italy, however, is still to be done.

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NOTE

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