Logic, Argumentation & Reasoning

Interdisciplinary Perspectives from the Humanities and Social Sciences

Volume 26

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Discoverability

The Urgent Need of an Ecology of Human Creativity

Springer

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Our faculty of guessing corresponds to a bird's musical and aeronautic powers; that is, it is to us, as those are to them, the loftiest of our merely instinctive powers. I suppose that if one were sure of being able to discriminate between the intimations of this instinct and the self-flatteries of personal desire, one would always trust to the former. For I should not rate high either the wisdom or the courage of a fledgling bird, if, when the proper time had come, the little agnostic should hesitate long to take his leap from the nest on account of doubts about the theory of aerodynamics.

Charles Sanders Peirce, Collected Papers, 7.48, 1907

To my daughter Lorenza and to my grandson Valentino

Preface

We academics all know that philosophers of science are not involved—neither directly nor indirectly—in decisions regarding public policy: it seems that policy decisions must be based on social goals and other factors that have nothing to do with epistemology. At this point, it seems that various aspects of current decision making in commercialized scientific research, for example, in biomedical area, are jeopardizing discoverability in science and therefore scientific creativity and human creative abduction in general. Furthermore, what we can call the "perfect epistemic storm"—which is not directly addressed in this book and has been generated by the many failures and confusions happened during this corona virus era—is visible to everyone. As an epistemologist, I am just indicating the problem of protecting discoverability, which I also think is at the base of the epistemic disasters of the present time of the pandemic: too many aspects of the socio-economical organization of science—increasingly business oriented—put in danger the genuine tradition of objective science and some of the best aspects of the human abductive scientific cognition. I do not have "practical" suggestions and solutions, but surely the smart people who are involved in economic and political decisions and at the same time are interested in favoring the further growth of science and civilization in the Western world will find ones.

The book addresses the problem of discoverability and consequently of the sustainability of human creativity in an "eco-cognitive" perspective, with special attention to science, and concentrates on the question of hypothesis generation and choice, that is, on creative abduction and on the conditions of its possibility, traditionally disregarded by philosophy, logic, epistemology, and cognitive science. I think the intellectual, didactic, but also "social" virtues of providing an analysis of discoverability are extremely important: having a better knowledge of discoverability—for example, in science—enables a better promotion of human creativity, which is the condition of possibility of increasing other kinds of knowledge, always needed in our technological era. Reaching higher degrees of discoverability should also shed new light on the current negative challenges to human creativity and consequently on the obstacles to the cognitive and social flourishing of human beings.

To further illustrate the importance of sustaining human creativity through the enhancement of discoverability, the example of the recent Encyclical Letter of the Holy Father Francis, head of the Catholic Church, is very useful. In the recent Encyclical Letter, Laudato Si' of the Holy Father Francis on Care for Our Common Home the Pope quotes several times the importance of *human creativity* in solving the many problems of humanity that are illustrated. Creativity is seen as a fundamental tool necessary to fix the failures of our societies and of our lives. Just to make some examples, we find the following sentences: "In order to continue providing employment, it is imperative to promote an economy which favours productive diversity and business creativity" (129), "creativity should be shown in integrating rundown neighbourhoods into a welcoming city" (152), "[. . .] political and institutional frameworks do not exist simply to avoid bad practice, but also to promote best practice, to stimulate creativity in seeking new solutions and to encourage individual or group initiatives" (177). Moreover, the awareness concerns the fact that in current societies, creativity is jeopardized, and this is exhibited: speaking of the effect of technology, we find, for example, the following sentences "Our capacity to make decisions, a more genuine freedom and the space for each one's alternative creativity are diminished" (108) "Human creativity cannot be suppressed" (131).

Chapter four of the Encyclical Letter introduces the need for an *integral ecology*, also necessary in education, and many subtypes of ecology are illustrated: first of all, environmental, economical, and social ecology, but also cultural ecology, ecology of daily life, human ecology, and ecology of man ("man too has a nature that he must respect and that he cannot manipulate at will"—155). In all these endeavors, related to the emancipation of human lives, human creativity is so fundamental that I would strongly suggest to *integrate* the Encyclical deontological commitments with what I call *ecology of human creativity*.

My proposal of an integration of the Encyclical deontological commitments actually resorts to the need of accepting that an ecology of human creativity has priority over the others illustrated in the Encyclical Letter: consequently, a first ecological duty is the one that protects and sustains human creativity because it is exactly human creativity that can grant the implementation of the other kinds of ecology I have just quoted from the Encyclical letter. I consider the *ecology of human creativity* a *conditio sine qua non* in the following sense: I am convinced that without creativity and skillful human capacities, all the other envisaged and invoked ecologies and sustainability, in general, tend to sadly fail. Sustaining the eco-cognitive conditions of discoverability is fundamental because only creativity can grant the implementation of the other kinds of ecology, which are urgently at play in our era, so that the ecological improvement can in turn positively affect human creativity.

In the present book, I will, for example, illustrate the importance of sustaining the so-called epistemic niches, that is, those eco-settings that have the potential for scientific creativity. I will center my attention on scientific creativity because of its importance in our current societies and collectives, not only because of its intrinsic—so to speak—value but also because in our technological era, full

of science-based artifacts of various type, knowledge in general, and scientific knowledge in particular are fundamental. In my book *Morality in a Technological World. Knowledge as Duty* (Magnani, 2007), I treated this issue extensively, arguing that the maintenance and flourishing of technological societies require a great deal of new scientific and ethical knowledge as well as modern approaches to moral deliberation, and to achieve these goals I provided compelling analyses, also offering a variety of strategies we might use to solve them. I believe that producing and applying recalibrated appropriate general, scientific, and moral knowledge has become a duty. It is in this vein that I analyzed troubling issues such as cyberprivacy, globalization, bad faith, cloning, biotechnologies, and ecological imbalances: the right creative knowledge, I think, can manage these challenges and counter many of technology's ill effects by preserving ownership of our own destinies, encouraging responsibility, and enhancing freedom. However, creative knowledge can completely flourish only when discoverability is sustained, protected, and enhanced.

A consequence of the above considerations is the following: if creativity is jeopardized, and in particular scientific creativity, it is practically impossible to acceptably and successfully deal with our technological societies, also from an ethical perspective: this means that the need of an *ecology of human creativity* I am endorsing here is rooted in the observations I have just sketched, quoting my book of 2007.

The present book, which aims at improving knowledge of discoverability, will take into account:

- the *distributed* and *embodied* nature of scientific cognition, ultimately related to the idea of the importance of the external cognitive tools and mediators in cognition;
- the central role of the dynamics of the production and of the rational handling of hypotheses, by referring to the various multimodal aspects of *abduction*, visual/diagrammatic, verbal-propositional, emotional, and manipulative;
- the fact that science is characterized by a *maximization of abducibility*, performed thanks to specific constraints.

These topics are analyzed in terms of what I consider the main tenets of an eco-cognitive approach to the epistemology of discoverability:[1]

1. *Chapter one*
   Fruitfully approaching the problems of discoverability involves an important intermediate step, which concerns the role of abductive cognition, that is, reasoning to hypotheses, and the logical models of it. To this aim, when engaged in formalizing abductive reasoning, it is extremely useful to see inferences adopting the more general concepts of input and output instead of those of premisses and conclusions. Indeed, from this perspective, abductive inferences can be first of

[1] A considerable part of the recent academic literature—for example in social epistemology—refers the word epistemology to the whole area of cognitive reasoned activities. In this book, I basically adopt its classical intended meaning, which refers only to scientific cognition.

all seen as related to logical processes in which input and output fail to hold each other in an expected relation, with the solution involving the modification of inputs, not that of outputs. Unfortunately, if input and output fail to hold each other in a "good" relation, it becomes very difficult to solve the related abductive problem: discoverability is jeopardized. In this perspective—and given the fact science produces and "maximizes" cognition through a process in which affirming truths implies negating truths—the analysis of abductive processes leads us to the emphasis on the importance of the following main aspects: "optimization of eco-cognitive situatedness," "maximization of changeability" of both input and output, and high "information-sensitiveness." I will also illustrate that irrelevance and implausibility are not always offensive to reason, and so they can favor both discoverability and discovery. For example, we cannot be sure, more broadly, that our guessed hypotheses are plausible (even if we know that looking—in advance—for plausibility is a human good and wise heuristic), indeed an implausible hypothesis can, later on, result plausible.

2. *Chapter two*
   Recent research in the area of the so-called EEEE cognition (extended, embodied, embedded, enacted) has shown that human cognition and its evolutionary dimension can be better understood in terms of their environmental situatedness. This means humans do not retain in their memory rich representations of the environment and its variables, but they actively manipulate it by picking up information and resources upon occasion, already available, or extracted/created and made available: information and resources are not only given, but they are actively sought and even manufactured. In this sense, we can consider human cognition as a chance-seeker system. Consequently, in my terminology, chances are not simply information, but they are also "affordances", namely environmental anchors that allow us to better exploit external resources. Discoverability is of course related to the availability of the appropriate affordances. Abduction is still important: it describes all those human and animal hypothetical inferences that are operated through actions made up of smart manipulations of the environment to both detect new affordances and to create manufactured external objects that offer new affordances/cues. A final section deals with the defense of the inferential view of abduction, affordances, and cognitive niche construction (based on epistemology and cognitive science) and their importance for the analysis of discoverability, against the reductionist attitudes due to some interpretations provided by the predictive processing theory, based on the idea of a Bayesian brain.
3. *Chapter three*
   In this chapter, with the help of the concepts of locked and unlocked strategies, abduction, and optimization of eco-cognitive openness, I will describe some central aspects of the cognitive character of reasoning strategies and related heuristics, with the aim of shedding new light on the cognitive aspects of deep learning machines and their impact on discoverability, and so creativity. Taking advantage of my studies on abduction, I will contend that what I call *eco-*

cognitive openness is undermined in the case of famous computational programs such as AlphaGo/AlphaZero, because they are based on *locked abductive strategies*. Unlocked abductive strategies, which are in tune with what eco-cognitive openness requires, qualify those high-level kinds of abductive creative reasoning that are typical of human-based cognition, and locked abductive reasoning strategies are instead much simpler than the unlocked ones to be rendered at the computational level. The second part of the chapter emphasizes, taking advantage of the logical and cognitive studies introduced in the previous chapters, the importance of *knowledge in motion*—in multidisciplinary, interdisciplinary, and transdisciplinary scientific research—and its role in favoring high-level kinds of discoverability, and so of abductive results and of the so-called "optimization of eco-cognitive openness and situadedness." The concept of "knowledge in motion" is also the necessary conceptual premise of the analysis of various kinds of "*epistemic irresponsibility*," which are illustrated in chapter four.

4. *Chapter four*
   In this chapter I will analyze some important aspects of the organization of research and development (R&D) in the case of biopharmaceutical companies, which represent a prototypical situation of what I call impoverished epistemic niches. At least in this case we clearly see a challenge to the epistemic integrity of modern science. Taking advantage of the logical and cognitive studies illustrated in the previous chapters, which emphasize the crucial role played in abductive cognition by the so-called "optimization of eco-cognitive openness and situadedness," this chapter will describe the hot problem of the current emergence of disparate kinds of "*epistemic irresponsibility*" that strongly jeopardize discoverability.[2] Interesting cases related to the commodification and commercialization of science, marketing of technoscientific products, and impoverishment of the so-called epistemic niches are illustrated, which show that human fruitful abductive cognition in science is increasingly assaulted and jeopardized, and at the same time human creativity is seriously endangered.
5. *Chapter five*
   Taking advantage of the logical and cognitive studies illustrated in the previous chapters, which emphasize the crucial role played in abductive cognition by the so-called "optimization of eco-cognitive openness and situadedness," "knowledge in motion," and the concept of "epistemic irresponsibility," the present chapter will introduce the concept of overcomputationalism, to help interpret the related concepts of pancognitivism, paninformationalism, and

[2] In this chapter I prefer to adopt the expression epistemic irresponsibility (instead of epistemological irresponsibility), because I attribute to the adjective epistemic a restricted meaning. "Epistemic" pertains to scientific knowledge or the conditions for acquiring it, which involve eco-cognitive situations in which not only scientists but also other economical, political, and institutional agents directly or indirectly intertwined with scientific research are involved. Instead, "epistemological" also expressly refers to the philosophical community of epistemologists, who in general are not affected by epistemic irresponsibility, but by other problems such as, for example, philosophical irrelevance or scholasticism.

pancomputationalism and their impact on discoverability. In the second part of the chapter, I will submit to the attention of the reader a question that in my opinion synthesizes many of the problems described in this book: will the future of eco-cognitive settings be computationally tailored or humanly tailored? The challenges against human creative abduction and epistemic rigor on the part of what I call computational invasive "subcultures" and unwelcomed effects of selective ignorance are illustrated. Finally, I will describe two fundamental roles played by human knowledge and the need of their continuous enhancement to the aim of sustaining discoverability: to maximize the ownership of their own destinies, thanks to everyday, philosophical, and scientific knowledge about natural and artificial phenomena human beings have improved their capacities to track the external world; in turn thanks to ethical knowledge humans have learnt to track the behavior of other human beings to the aim of favoring cooperation.

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Pavia, Italy Lorenzo Magnani
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Reference

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