

Chapter 3

Scientist Because Philosopher, Philosopher Because Scientist



Critical thought does not begin with a suspension of the usual modalities of knowledge, thus inaugurating a new, purely human, course. Rather, it reflects more carefully on those modalities as they relate to things, therefore grounding itself in the real. Science and critical thought are therefore synonymous.

(Prodi 1974: 147)

Abstract Why did Prodi, while engaged in his scientific work, begin to study and to write philosophy? In this chapter, I will attempt to answer this question. The guiding idea is that Prodi realized that, in order to truly be a scientist, one needs to reflect on what it means to be a scientist. Otherwise, the scientist loses the intrinsically ethico-political dimension of his or her work. But once Prodi stepped into the philosophical field, he could not stop, since—consistent with his belief in continuity—he realized that every philosophical problem is intimately connected with others. Prodi the scientist becomes Prodi the philosopher.

Keywords Science · Philosophy · Critical thought · Darwin

Giorgio Prodi was a scientist—an oncologist—and precisely in his role as a scientist, he began to be preoccupied with the scope of his scientific practice: questioning what he was doing when designing an experiment, how to conduct it, and what discoveries it would allow (when successful), that is, what the nature of the object of the experiment was. But his main interest was answering the question: what makes knowledge possible? These are not the sort of questions usually asked by the average scientist, too busy with the immediacy of laboratory work, with observation, and with the analysis of experimental results. But Prodi must have been a curious kind of scientist, in the philosophical sense of the word—that is, a person that is not content with doing something but who also asks why he or she is doing it. His questions are philosophical, that is, questions about the meaning of a certain activity, rather than about how to perform it, or about its proximate outcomes. These are

the kind of questions addressed by many philosophers, but their answers likely did not satisfy Prodi, since his new philosophical adventure began precisely from the attempt to formulate new answers: in just a few years (from 1974 to his death), he developed a complete—and rather original—theory of knowledge and of biological reality as a whole. A theory that reinterprets in a biological key semiotics and the theory of knowledge, and through them ontology as a whole.¹ In this chapter, before attempting to present at least some of the ideas contained in such a vast and complex body of work, I want to try to explain why Prodi found the common philosophers' answers so unsatisfactory. It is common to believe that the problem of knowledge pertains, roughly put, to the encounter of the knower—the subject, according to traditional terminology—with that which he or she is experiencing, the so-called object. How can the former know the latter? That is to say, the problem of knowledge would be that of reconciling two poles of a fundamental dualism, that between the subject and the object. Such a radical dualism is irresolvable, since no matter how much effort on our part, the object will forever remain too distant from the subject: the subject is separated from the object because of its different material composition (as in Eccels' case, as we just saw. See Lavazzo and Robinson 2014), because it is governed by different principles (the first is moved by reasons, the second by causes), or because it acts according to different modalities (the first is active, the second is passive), and so on. In all these cases, one could never offer an explanation of the puzzling fact that knowledge works: that is, it has real effects upon the world. This dualism cannot be recomposed, and knowledge—something that a scientist like Prodi experiences every day—remains inexplicable, as a kind of embarrassing mystery (at least for some philosophers). Prodi, on the other hand, gave an apparently simple but profoundly radical answer to the question of the possibility of knowledge: an answer that, instead of duality and discontinuity, presupposes continuity and the unity of biological systems. For Prodi “knowledge ‘emerged’ from things, and it can know them since it is shaped by them and shares their same origin” (Prodi 1974: 134).

It is not we, presumptuous subjects, who know the object. Rather, things let themselves be known by us, subjects who are nothing but the ultimate transformation of other things, in turn connected with more things, and so on all the way to the very objects we are knowing. The world does not include an a priori distinction between subjects and objects, which would be separate and autonomous, but only one between more or less complex organisms, linked by an infinitely articulated fabric of relations, which coincides with life (and semiosis, and therefore knowledge, as we will see). If every dualism is based on the model of two separate and opposite poles, Prodi's model is a biological one, grounded on the evolution of every form of life, wherein no gap ever exists, but only transformations and transla-

¹For this reason, Prodi's theory is an ontology, that is, a description of the structure of the world, based on biosemiotics: a systematic bio-ontology. Prodi's perspective is similar to that of Buchanan (2008), although his book is never cited. According to Buchanan, “ethology emerges as the significant dimension in framing the being and becoming of the animal. The animal body is interrelated with its environment through the process of behavior, so it becomes a question of how to engage the ontological dimension of this relation” (Buchanan 2008: 5).

tions of shapes into other, more or less complex, shapes. Subject and object can never constitute the starting point of the process of knowledge. They can at best represent its end state: one never fully realized, since such a complete separation would break the biological continuity that binds them together—and this would entail not just the end of knowledge or of semiosis but of life itself. The dualist model can be schematized as based upon two distinct points that need to be somehow connected; the biological model, on the other hand, can be represented as a circle (or a spiral; see Chap. 10), since there is no life form that does not derive from another life form and that does not ultimately return to life itself. Knowledge, then, is not a view from the outside towards the world, but it is the gaze that each particular thing—the thing which the philosophers call the “subject”—casts upon some other thing, the so-called “object”. Knowledge is a relation between worldly things.

Modern philosophy—starting at least with Descartes—seems to have been dominated by the model of the straight line and of the direct opposition, and to exhibit a certain fear of the circle, often accused of being a “vicious” one, because it always returns to its starting point. Prodi’s philosophical work can be interpreted as a systematic application of the model of the circle to semiotic and biological phenomena. Where the straight line presupposes and reproduces both a separation and a distance between two points located at its extremities (subject and object, mind and body, spirit and matter), the circle has no beginning and no end. Life indeed has, strictly speaking, no beginning, since it is best described as a continuous process of transformation: from forms to different forms. Life does not begin in a body, at moment t , as if at moment $t-1$ there was still no life. Schrödinger’s definition illustrates this point, explaining how, and in what circumstances, a random “piece of matter” can be considered “alive”:

[w]hat is the characteristic feature of life? When is a piece of matter said to be alive? When it goes on ‘doing something’, moving, exchanging material with its environment, and so forth, and that for a much longer period than we would expect an inanimate piece of matter to ‘keep going’ under similar circumstances. When a system that is not alive is isolated or placed in a uniform environment, all motion usually comes to a standstill very soon as a result of various kinds of friction; differences of electric or chemical potential are equalized, substances which tend to form a chemical compound do so, temperature becomes uniform by heat conduction. After that the whole system fades away into a dead, inert lump of matter. A permanent state is reached, in which no observable events occur. The physicist calls this the state of thermodynamical equilibrium, or of “maximum entropy”. (Schrödinger 2013: 69)

According to this physical picture, there is no special essence, proper and exclusive of “life”, which mere matter would not possess. A phenomenon is an instance of life if it remains itself and changes itself *at the same time*. There is no life if that “piece of matter” becomes incapable of transforming itself, while retaining its identity. For this reason, the model of the circle is well-suited to describe life phenomena, since the circle does not proceed towards a direction, only to stop once the destination has been reached. The circle always repeats its perpetual movement: the circle *is* nothing but movement. Prodi’s predilection for the circle, and rejection of the fixity of the straight-line model, probably derives from a book by another important Italian

philosopher, Enzo Melandri's *La linea e il circolo. Studio logico-filosofico sull'analogia*, first published in 1968. The circle is usually criticized for being "vicious", always going back to its starting point. But is this accusation justified? The straight line is the model of dualism, while the circle is the model of analogy and therefore of mediation and of continuity. Why would opposition and dualism be more relevant—from a logical and an ontological point of view—than the principle of analogy, that is, the idea that the connections between things (thoughts or objects) are always gradual, blurry, and continuous? Why assume that the separation is at the origin of the process of knowledge, rather than knowing relation itself? The two poles—subject and object—which are the endpoint of any dualism "have this problem: by establishing a radical dichotomy they make it impossible to comprehend the matrix from which the terms of the relationship depend. This comprehension requires instead that the point of origin be given precisely by that which appears — when starting with two opposite poles — like a *tertium comparationis*: the principle of analogy" (Melandri 2004: 792). This *tertium* would really be more than a simple analogy: a generative space upon which the internal articulation of the other two poles depends. But to rehabilitate the principle of analogy—a sort of logical equivalent of the principle of continuity in the biological domain (later we will see how continuity does not imply gradual evolution; see Chap. 7)—means precisely to favour the model of the circle over that of the straight line: "the metaphor of circularity should be given a more reckless interpretation. The criticism of the circle as a 'fallacy' in itself represents a certain 'rectifying' fallacy, with remote metaphysical origins. Why would a linear order be preferred to a circular one? Why the line and not the circle?" (Melandri 2004: 794).

The image of the circle also helps understanding Prodi's peculiar way of being a philosopher and a scientist and therefore a scientist and a philosopher. In fact, this is the most challenging facet of Prodi's intellectual outline—but also the most important one—a difficulty that explains why his theoretical work has been so easily forgotten. The crucial point is that, for Prodi, it is impossible to be scientists without also being philosophers and vice versa. Today's science is thought to be a special activity and philosophy to be a completely different endeavour, a purely speculative—and therefore inferior—activity (it is no coincidence that older scientists, too old to be at the cutting edge of their discipline, attempt to write philosophical books, while the opposite does not happen: an elderly philosopher does not fashion himself or herself as a scientist). Science today has gained such an elevated position of autonomy and veneration that any other kind of discourse is considered inferior. Prodi shows us how wrongheaded this is, because a scientist who is not also a philosopher can never be a good scientist. The premise of this stance is explicitly stated in the opening pages of his epistemological treatise: "what is common to all those discourses that define science as a practical endeavour, aimed at transforming the world, is their lack of understanding of what science is" (Prodi 1974: 5).

In particular, the scientist (but also the philosopher) does not understand how his or her activity is not isolated from, on the one hand, the rest of human epistemic activities and, on the other, from the biological origins of human knowledge. In sum, Prodi takes Darwin's gradualist approach seriously (Mayr 1982: 508–9): the

scientist, like the philosopher, is nothing but one of the many, infinitely varied, forms assumed by life on earth. The scientist, from this point of view, is nothing but a mode of being of a single underlying vital principle:

there is grandeur in this view of life, with its several powers, having been originally breathed by the Creator into a few forms or into one; and that, whilst this planet has gone cycling on according to the fixed law of gravity, from so simple a beginning endless forms most beautiful and most wonderful have been, and are being evolved. (Darwin 2006: 429)

Darwin's "creator" is life itself, that is to say this continuous process of transformation. It is for this reason that the scientist is also a philosopher, because science—its prestige and effectiveness notwithstanding—is still a human, animal, biological activity: in the final analysis, a vital activity. Prodi as a philosopher is fully conscious of this absolute biological continuity. Before the appearance of the scientist and the philosopher, there is the world of life, one composed by change and relations. Prodi, as a philosopher, understands that life means relation, contact, merging: "the starting point [...] is therefore nothing but the recognition of a structure-thing nexus, that is to say the existence of a system of interactions. [...] In other words, we should start by assuming the physical-biological character of the epistemic process" (Prodi 1974: 27). But what does this concretely mean? It means that the knower, the subject, is always already involved in that which is known: that is, the subject is nothing but a continuation, in a different form, of the object. Prodi writes: "if the object is 'known' as involved in a network of relations and part of this structure—and therefore never as an isolated and constant element—then it will be impossible for it to be seen 'at a distance' or to be 'criticized'. Rather, it can only be immediately manipulated and consumed" (Prodi 1974: 43). It is in this sense that the subject is *taken* by the object and the object is *absorbed* by the structure of the subject. This model foregrounds the *relation* (at once epistemological and biological), by deprioritizing the *terms* of the relation.

By foregrounding, in his philosophical thought, the concept of relation—as a vital field wherein the organism meets its environment and where the latter envelops the former—Prodi ends up questioning his own work as a scientist and particularly as an oncologist. The starting point is always the same: in nature, no entities or activities are completely separate and autonomous. Knowledge, including its most specialized and sectorial forms, is part of a larger ensemble of various types of epistemic "metabolisms", proper of different living organisms. The moment the scientist becomes aware of this radical non-separation, then he or she steps into philosophical terrain:

[K]nowledge is a biological process of interaction, and its methods are relative to things and to structures. [...] If this field of action is circumscribed as a scientific object — that is, if knowledge is applied to things with an eye towards them and one self-consciously toward its ways of check [riscontro] — it then becomes critical thought: a self-examination in relation to other things, a self-analysis, and self-critique. Critical thought is not a secondary stage of the epistemic process, or a kind of super-knowledge. Rather, it is an additional differentiation of a natural evolution, reaching the point of turning the entire system and structure of things into an object of knowledge, analysing its reciprocal interactions, the characteristics and limits of the check, and its principal internal modalities. (Prodi 1974: 146)

Philosophy then would not be a supplementary, additional, and merely theoretical form of knowledge, subordinated to science. For Prodi the philosopher is a scientist who has thematized his or her own role as a scientist. The dualism between science and philosophy is therefore finally decommissioned. Prodi's monograph *La scienza, il potere, la critica* contains, in an embryonic and implicit form, the entirety of Prodi's later philosophical output. For example, once the scientist poses the question "what am I doing, when practising science?", he or she is clearly stepping into the proper domain of ethics. The problem of the scientist's responsibility—of ethical or ecological nature—is not an additional issue, supplemental to his or her more straightforwardly experimental scientific work. The scientist-philosopher cannot but formulate this question, for otherwise he or she would not be a proper scientist, since "morality is nothing but an aspect of knowledge" (Prodi 1979: 187). The scientific attitude is intrinsically ethical. More specifically, as we will see later on (see Chap. 8), the objectivizing gaze of the scientist presupposes the ability to take care of the object studied, to isolate it from the network of relations it is embedded into, and to treat it as something special. But this already constitutes an *ethical* way to look at the world: "it is knowledge itself that, evolutionarily speaking, needed this attitude in order to become reflexive and propositional—what we call morality. Morality is an intrinsic component of knowledge and of the development of the human mind" (Prodi 1987a: 42). This is like asking what the origin of this attitude towards the world is: hence Prodi's research into biosemiotics, tackling the question that opened this book—how is meaning possible in the world of things? (Sebeok 2001; Barbieri 2009). To know means to attribute a meaning to events. A certain event has a meaning, while some other does not: to know means to distinguish and to set apart phenomena that are relevant for a certain form of life from all the other meaningless ones. A pertinent event for a form of life is a significant event, an event with *meaning*. Prodi then, as scientist-philosopher, asks: what is the natural origin of meaning?

[t]he elementary case of an enzymic reaction allows us to formulate a more general argument. If we consider the enzyme as a pre-given structure (with a long evolutionary history, even in the most elementary of cases) this entity explores and knows only one section of the world, in a restricted and determinate space, its own substrate. It only reacts to (that is, it knows) what corresponds to that onto which, evolutionarily, it has modelled itself. Its knowledge has an extremely narrow range. Its capacity for exploration and manipulation is rigid and automatic. But what is the metabolic knowledge that the enzyme has of its substrate if not the discovery, among the indifferent things in comes in contact with, of what is complementary to itself, that makes it move, that has a meaning, that is a sign? (Prodi 1974: 231)

Now, if life is tantamount to being in relation to a meaning—i.e. acquiring knowledge—the problem of the *internal* limits of knowledge cannot be avoided. Once again, this question is nothing but a development of the biological premise of Prodi's reasoning. To know means, as we just saw, to distinguish and to attribute a meaning to phenomena. But this also means that every act of knowledge leaves behind a residue: everything that is not meaningful to a form of life in a particular moment of its biological development. Therefore knowledge at the same time produces ignorance.

Prodi calls this residue “mystery” or “darkness” [buio]. This “mystery” is not something irrational and unthinkable; on the contrary it is the product of the internal functioning of reason and of thought. We can know something only because we are within it: only in this way can we distinguish that which—from our point of view—is meaningful from that which is meaningless. But every “within” implies and presupposes a radical “without”: “if the world is much larger than our frame, and it dwarfs us physically and historically, then our inclusion within it is the crucial node of both existence and knowledge. There is always a without, a mostly dark area, and it is unthinkable that that could ever be extinguished” (Prodi 1974: 169). Once again Prodi, as a scientist-philosopher, finds it necessary to pose the question of the “mystery”, that is to say to question the ultimate meaning of human experience, now no longer exclusive province of philosophers or theologians. Prodi can then establish the problem of the sacred in purely scientific and biological terms, because the scientist who reflects critically on his or her scientific work is, in a certain sense, forced to do so, since the problem of the limits of knowledge is inseparable from the question of knowledge itself. So, the problem of the sacred—like the question of the “mystery” and the “darkness”—is internal to the scientific enterprise itself: “so the mystery is that which is utterly unsayable, potentially open to knowledge, lying on the horizon of our interactions” (Prodi 1974: 170). It needs repeating then that the “mystery” is unsayable not because it is irrational or because it would go beyond our thought and our expressive resources: on the contrary, it is unsayable because it is located in the middle of the sayable, that is, of scientific knowledge. Science continuously produces “mystery”. Therefore, there is nothing more risible than those scientists, unaware of their own doing, who attempt to “scientifically” resolve the problem of the “mystery” (like those who endeavour to “prove” or “falsify” God’s existence). The truth is that “mystery”, like the horizon, recedes the more we get close to it. The horizon is not unreachable because of some unknown force, hindering our progress: we ourselves are the “mystery” of the horizon.

Lastly, there is also a political consequence of this stance. The image of human nature that emerges from Prodi’s thought is that of an animal who is in a perennial state of crisis, since the fundamental operation of meaning attribution also produces, time and again, its opposite—that which is meaningless: “essentially, then, our very nature is constituted through this crisis” (Prodi 1974: 384). The human is the living being characterized by a “constitutive crisis”. It is therefore an unsettled, dangerous, and curious animal, always faced with the “mystery”. As usual, it is necessary to track the biological origins of this living being: if life means meaning and knowledge, the particular way of knowing of the human animal largely depends on language—“the immediate expression of the intersubjective character of knowledge is language. The possibility of communicating, in any way, is part and parcel of the process of knowledge. It is impossible to imagine a scenario in which knowledge would develop as a self-referential relational possibility, and only later would become communicable. Communication and knowledge constitute one and the same process” (Prodi 1974: 223). But “intersubjectivity” means different points of view, clash, and conflict. This is the bio-epistemic motivation for politics: nothing but the attempt—constantly on the verge of failure—to come to terms with such a

restless organism. Prodi writes: “since human nature is essentially a social and collective product, there is nothing that can be produced by it that is not political. In this sense, politics is itself a scientific-epistemic activity” (Prodi 1974: 402). At the roots of this reasoning, there is, once again, the human’s peculiar natural history: “language and thought belong to human biology [...] [and are its] distinctive traits” (Prodi 1989: 92). But this means, as we have just observed, that human nature is itself a synonym of “crisis” and “mystery”. Herein lies the biological origin of politics (and obviously not in the social behaviours of primates). Prodi’s political reflections are not an additional, artificial addendum to his scientific and philosophical work: rather, there is politics because in every “enzymatic reaction”, there is a choice and therefore meaning and conflict—in short, politics.