Chapter 9
Breaking the Circle

The evolution of language coincides with the evolution of consciousness, which is in its very nature linguistic. The broadening of the field of inquiry is also a broadening of language.

(Prodi 1974: 226)

Abstract Prodi explains semiosic phenomena by means of the model of the circle. This model allows to account for a very important feature of the natural world: in life phenomena, there is no a one-way causal arrow, from the lenvironment to the living organism and vice versa. According to Prodi in the lifeworld, there is a two-way relation between cause and effect; the genotype causes the phenotype, but the latter in turn modifies the evolutionary environment, thus ultimately applying an indirect causal pressure back on the genome itself. In this way, it is possible to account for the dynamism of the world of life. The biological world, the world of semiosis, is not closed off, but it continuously expands and develops. The circle of life is best conceived as a spiral. The transition from the circle to the spiral is necessary in order to account—in a biological register—in particular for the evolution and the mutation of human language and culture.

Keywords Language and world · Language and knowledge · Model of the circle and of the spiral

According to Prodi, human language is a biological phenomenon. However, he also considers culture to be a biological phenomenon. A phenomenon is defined as cultural when it is not determined by genomic necessity only, when it allows a more or less degree of freedom and choice. But Prodi also considers complementarity (see Fig. 6.2) to be a cultural phenomenon. As we have seen, everything in the world is a "reader" of its surroundings; but "to read" means to *interpret* (since reading is not a simple decoding; to read means to select what is relevant and discard what is not relevant). This means that even the most elementary of natural phenomena are somehow cultural, i.e. not completely predetermined: "in nature complementarity is

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above all a reading, an interpretation, that is to say an exchange subordinated to a reciprocal meaningfulness" (Prodi 1977: 26). As we know, something can be meaningful for a particular thing and not for another thing: meaningfulness implies selection and choice, even though this is an unconscious and non-intentional choice. Going back to our example of two things, *A* and *B*:

> the process of encounter is therefore a reading or interpretation of reality, operated by *A* and *B* according to their constitutive modules. Therefore, *A*'s and *B*'s reading of reality is a survey of the environment, discarding irrelevant things and selecting those that are meaningful. Through the exploratory process that terminates with its contact with *B*, *A* evaluates reality, since it is prompted to change only when it finds a complementary and meaningful reality. (Prodi 1977: 26)

Nature is both within culture and within language, but this also means that there is something cultural (reading and interpretation) within nature. It is necessary to recognize the error of a nature-culture dualism and rather understand that culture is natural and that—something which will surprise naïve materialists—nature, and human nature in particular, is somehow cultural:

> [m]an is constitutively characterised by communication through systems of exchange. It differentiates itself from other organisms because it is capable of acting through the mediation of an abstraction […]. This is […] a radically new way of interacting with nature […]. Man is genetically gifted with linguistic competence but languages are not a mere fuel for the functioning of the logical machine. Languages have two sides to them: on the one hand, they are used to communicate, like an instrument. They are useful because they have been designed for this purpose. On the other they also have a formative function, expressed when the individual begins to apply his competence […]. It is as if the fuel would contribute to the construction of the machine it fuels. (Prodi 1987b: 196)

Dualism, in all of its forms, considers biological phenomena as guided by principles that are wholly different from those of culture and of history. Prodi's proposal takes us, in one fell swoop, beyond this quaint (but ever-returning, see Lavazza and Robinson 2014) opposition between nature and artifice, between biology and culture. The expressive power of human language does not depend on an arbitrary bestowing of meaning to a signal; it is rather the final manifestation (ignoring its own origins) of a natural meaningfulness whose primordial exemplification is to be found in the most elementary biological interactions:

> [l]anguage cannot but be a phenotypical or functional expression of an underlying "language skill", that makes itself manifests in the very first forms of biological organization and that gets increasingly complex after that. Language is necessarily grounded upon a — wholly pre-linguistic — historical connective layer of reciprocal meaningfulness that, at a given moment, is *also* able to constitute a language or, alternatively, to evolve into a language. The ever more complex logic of connection of meaning constitutes the deep structure of language: as a function it is somehow unique to man, but it can be explained only where understood through its biological and genetic roots. (Prodi 1983b: 189)

In this way nature itself becomes a kind of endless and infinitely complex "translation network": "every chapter of molecular biology is the exemplification of how meaning progresses in nature: through the elaboration of structures and translation chains (for example, consider protein synthesis, the transmission of genes from two individuals along the germline, muscular contraction, or the transmission of

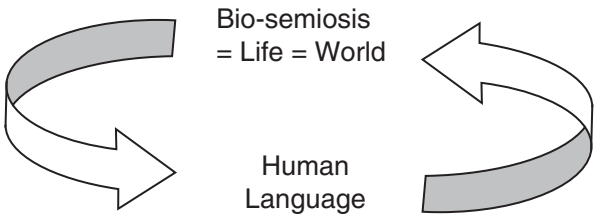

Fig. 9.1 Continuity between natural semiosis and human language

impulses)" (Prodi 1983b: 192). For Prodi, the key notion to understand the world of semiosis is *translation*: "reading never takes place simply at one stage, it is never mono-categorial […]: organisms converge towards the outside in complex readings. This convergence towards the outside coordinates and unifies the large number of mono-categorial internal readings" (Prodi 1983b: 190).

But if nature is an immensely complex translation network, an unending sequence of translations/transformations of objects into other—more complex and stratified—objects, a problem seems to emerge, which indeed afflicts all philosophies based on this schema: a problem intrinsic to the model of the circle. A circle is closed: there is, by definition, no escape from the circle. But life is change: that is to say that life is a continuous breaking of the circle. It is then necessary to understand how the circle can be broken and be transformed into a spiral. In the meantime, let us go back to the circle (Fig. 9.1).

This diagram illustrates the continuous line linking language to natural semiosis and, therefore, to the world:

> if we move from generic biological situations to language, the connective function that is proper to it appears as grounded on enormously complex and interconnected translation chains […] yet always respecting the transmission of the meaning of things to the reader, and then the reader's answer to this meaning, that is to say back again to the things. For language too, it is possible to state that, ultimately, things let themselves be read or spoken of. (Prodi 1983b: 192)

Language can speak about the world because it is nothing but the last, and most complex, manifestation of the primordial semiotic capacity of life itself, i.e. semiosis:

> [when] the identifications of meaning are so complex that they produce a separation between sign and referent […] it means that the chains between them are extremely long and complex, and that they can be only described through their emergent phenotypical aspects — those of an already-given language, to be analysed in its factual communicative features. Yet, biologically speaking, this situation must be based upon long translation chains with well-determined steps, capable of conditioning whether or not a selective reaction takes place. Linguistic reading is not a miniaturization of the real, and words are very different entities than the things they describe: but between a reading of the world and the world itself there is a semiotic link that derives from the composition of conditions of elementary proto-semiotics — in the form of extremely complex chains — both for what pertains to the structures meant for linguistic exchange, memorization, and learning, and for what pertains to the mediation globally represented by the whole of language and culture. (Prodi 1983b: 192)

We can speak about the world because—and herein lies the strength of the biological model of the circle—the world lets itself be spoken of through "our" language (in fact it is the language of nature), since "we do not attempt to explain things through our mind, but our mind through things" (Prodi 1987b:134). But Fig. 9.1 also shows another vector that starting from language and moving towards biological semiosis, i.e. the world. As we have already seen, Prodi does not want to merely root language into the world, but rather—faithful Darwinian that he was—he wants to highlight the peculiarity of human language vis-à-vis all other forms of semiosis. The diagram above seems to paradoxically suggest that—somehow, and once a certain threshold of complexity is crossed—language could become its own cause. This is an extremely important point, one only recently re-examined in the context of the debate on the evolutionary history of language (Deacon 1997). Once again, this is a theme deeply rooted in Jakob von Uexküll *Theory of Meaning*:

> Each subject's symbol is at the same time a meaningful theme for the structure of the subject's body. The body that houses the subject on the one hand produces the symbols that populate the surrounding garden and is, on the other hand, the product of these very same symbols that are the meaningful themes in constructing it. The sun owes its shine and its form high up in the sky that extends over the garden to the eye, as the window of the body that houses ourself. At the same time, the sun is the theme guiding the construction of the window. This principle applies to both animal and man; the same factor of nature manifests itself in both cases. (Jakob von Uexküll 1987: 113)

The origin of human language should not be sought in a neutral external reality, as it is frequently assumed by those who think that the main problem of a natural theory of language is the so-called symbol grounding problem (Harnad 1990); such a non-biological reality constitutes the common background for all forms of animal communication, and for this reason, it cannot represent the *specific* environment wherein the origins of human language should be sought. This element, Prodi argues, needs to be sought into language itself: the latter—once crossed a certain threshold of complexity—has determined the conditions for the development of ever more complex linguistic forms. Consider the case of the wings of birds: it is very probable that the first rudimentary forms of wings developed in dinosaurs did not serve the purpose of flying but simply functioned as highly visible surfaces displayed during mating rituals (Zelenitsky et al. 2012). But in order to be efficacious, these surfaces needed to be sufficiently light and large; at a certain point—as an unexpected collateral effect—these allowed the animals who had them to achieve brief flights. Now, the selective push does not only (or not simply) derive from a reproductive advantage but from flight too: the wing's structural complexity increases because evolution develops forms that are better adapted to this new and completely unexpected purpose. Flight, now the implicit purpose of the wing, selects forms that are ever more suitable for flying. The evolutionary push towards flight becomes the primary "engine" for the development of increasingly sophisticated wings. The evolutionary scenario that frames the development of the wing is now represented by the wing itself that, in this sense, becomes its own cause—the cause of ever more complex kinds of wings. Prodi argues that the evolutionary

environment of human language, as well as the human mind, is given—in a circular manner—by language, which has therefore "selected itself" (Prodi 1987b: 70).

Just like every thing selects its own reader, language—in the human world—is now selecting ever more evolved forms of language competence in order to adapt to itself, in a self-sustaining spiral. The circle is now broken. In this framework, the problem of the specificity of human language appears once again, being something different from other forms of natural semiosis. This specificity is to be located in the fact that the environment of language is the typical human environment, and therefore the intrinsic evolutionary push of this environment is towards the development of ever more complex forms of language, i.e. of ever more articulate networks of meaning, removed from a direct contact with the objects of the world. Indeed, for Prodi the difference between the language of the human animal and non-human forms of semiosis is to be located in the different levels of complexity between the mind of the former and that of animals:

> The animal is essentially a discriminating system, where the incoming stimulus is linked to certain behaviours. Reality (reality Y, for example) is the trigger for this *a priori* genetic machine that is the animal. It functions as a deductive apparatus. This does not exclude that the schema could be enormously complex, and include experience-determined modifications like certain forms of learning, complex behaviours, and rudimental criteria for valuation. But what is certain is that the animal already possesses this system (genetics + history) when it receives the stimulus. Within such an animal, valuation and reaction are coordinated (not quite in lockstep, but there is no dispersion in a "linguistic sea", like it happens in man). (Prodi 1987b: 55)

The environments of non-human animals, protocultural traditions of many species notwithstanding (Mainardi 1973; Laland and Galef 2009), are by and large stable through time: the borders of these environments seem to be fixed once and for all, or better yet they can only change over the extremely long timeframe of genetic evolution. The main reason for this (relatively) static nature is the fact that those who inhabit these environments are not aware of inhabiting it, since animals cannot represent their borders to themselves. This is implicit in Fig. 4.2: the "functional circle" is closed, and those who live inside of it cannot escape it, ignoring the very fact of being trapped into it: for this reason, they also cannot hope to transgress its boundaries. As Jakob von Uexküll writes, "every free-moving animal is bound to a specific habitat" (Jakob von Uexküll 1987: 91). As we have seen, the human environment is the world of language and of the omnipresent "epistemic compulsion" to transgress its limits. We know that this operation is biologically impossible, and yet we time and again attempt to perform it (through the formulation of hypothesis), with the result of enlarging the boundaries of language/knowledge: "the advantage we have over animals lies in the fact that we are able to extend the range of our inborn human nature. Of course we cannot create new organs, but we can assist the functions of our organs. We have developed perceptual aids and effector tools that make us able providing we know how to use them – to broaden and deepen our Umwelt. But we cannot go beyond the perimeter of our *Umwelt*" (p. 91). The human world is an ever-changing environment, enlarging itself, and—to use another of Prodi's analogies—is continuously looking for new "dark" [buio] areas to assimilate and "digest":

> [w]hat happens when language enters the scene? What happens when a sensorial entity, instead of following its relatively well-defined path, ends up in the sea of language, of global representation, of logic, and — finally — of consciousness? This sea is far from being an undifferentiated magma: it is a space dense with connections, the most interlinked and "informational" space in (presumably) the entire universe. The strange anticipating faculty that derives from this could suggest that the rules of the game — as well as the nature of the players — are completely different [as compared to the mind of non-human animals]. That is to say, it could seem to imply that in that sea there would be special kind of antennas, not detecting things through sensorial entities (and therefore the physical nature of the world) but rather linked to something contained *in* the things, and different from them: their essence, their idea, or something similar. (Prodi 1987b: 55)

In order to break out of the circle, Prodi leads us to a kind of paradox: on the one hand, the biological and historical past of the human animal "produces" language, but, on the other, language "produces" the human animal. This paradox can be only overcome by wholly accepting the peculiar semiosic nature—at once natural and cultural—of both the human animal and of its language and therefore the intrinsic dynamicity triggered by this circuit between mind and language. We thus move from the circle to the spiral:

> [h]ow is the human realized? The process of creation of the human is the evolutionary determination of logical-linguistic competence and of the relative neuronal structures *grounded on language itself*. Since the beginning, man is shaped by language: he becomes man *onto* language. Man is moulded by communication, and communication is language. The neurological structures are selectively shaped — they are evolutionarily selected — by language. (Prodi 1983b: 315)

The brain is adapted to language, but language too is adapted to the brain, to its limits, and its constraints: "let us assume that not only man manufactured languages, but also that languages manufactured man, as well as his specific logical and discursive competence" (Prodi 1987b: 48). Let us return to Fig. 9.1: once a certain threshold of structural complexity is crossed, human language becomes the cause of its own development, and so the evolutionary scheme assumes the shape of a spiral.

Natural semiosis, having become language, enlarges our knowledge of the world. In turn, this "selects" ever more complex and articulate forms of knowledge and language. Thus, the world *qua* set of all the "things that are meaningful *for*" (Prodi 1979: 188) is further enlarged and so on. The circle becomes an open spiral, "the evolution of language coincides with the evolution of knowledge, linguistic in its very nature. The widening of the field of exploration is at the same time a widening of language" (Prodi 1974: 226). The natural environment of language, and of the mind that manifests itself through language, now becomes not (just) the world of natural things but all that is represented by language itself. A dynamical structure like the spiral is continuous with those elementary forms of semiosis that preceded it—and that made its development possible—but at the same time, it also represents a substantial evolutionary novelty, since beyond a certain level of complexity, language becomes its own environment: "evolution is continuous, but not uniformly so. The way culture evolves is profoundly different from the evolution of the pre-human natural world, since in man new functions *naturally* appear" (Prodi 1987a: 93).

The spiral becomes progressively wider and produces ever more extended areas of "darkness". Knowledge does not reduce the amount of ignorance: on the contrary, it increases it. This is an implicit conclusion of Prodi's reasoning, according to which knowledge is always a "process" (Prodi 1974: 26), always relational and hypothetical: "the starting point is the contact with the terms of the process; not simply to accept them, but to experiment with them" (Prodi 1974: 27). For Prodi—like Peirce, from whose system Prodi's biosemiotics largely derives—there is no intuitive and unmediated knowledge:

> [m]oreover, we know of no power by which an intuition could be known. For, as the cognition is beginning, and therefore in a state of change, at only the first instant would it be intuition. And, therefore, the apprehension of it must take place in no time and be an event occupying no time. Besides, all the cognitive faculties we know of are relative, and consequently their products are relations. But the cognition of a relation is determined by previous cognitions. No cognition not determined by a previous cognition, then, can be known. It does not exist, then, first, because it is absolutely incognizable, and second, because a cognition only exists so far as it is known. (Peirce CP: 5.262)

The lack of an absolute starting point for knowledge also entails that the epistemic process is endless. Every new piece of knowledge needs to be understood, and therefore an "interpreter" capable of "explaining" it is necessary. A hypothetical "final" knowledge, if knowledge at all, would still need to be understood, and it would therefore require an "interpreter"—if so, it cannot be *final* at all. Hence it is language itself that continuously produces new "darkness". This point needs stressing, since it is what prevents the semiosic circle from becoming sterile, a vicious circle. According to the model we have thus far reconstructed, world and semiosis are coextensive. But does this mean that language completely covers the whole extension of the world? Does language fully "swallow" the world? Does biologizing language perhaps mean to eliminate once and for all every non-linguistic horizon? In Fig. 9.1 and Fig. 9.2 there is a first answer to this question: human language is located *within* an indefinitely more extended space—that of "darkness"—which, by definition, *exceeds* its logical resources, a space that is, and cannot but be, located *beyond* language. In fact, the passage from the circle to the spiral represents the passage from a (relatively) closed environment to an open one; the "darkness" is such an environment which is full of epistemic "problems". The "darkness" is what is produced when the world is read through language. The "darkness" is not simply the absence of world/language; on the contrary, it is the region from which language as a whole assumes its meaning: only insofar as it produces "darkness" can language have meaning. The presence of "darkness" means that language is not everything and that there exists something which is not language. Not only language cannot exhaust the world, but the signifying power of language seems to derive precisely from this exceeding of language by the world. Wittgenstein illustrates this point with exemplary clarity:

> 6.41 The sense of the world must lie outside the world. In the world everything is as it is and happens as it does happen. In it there is no value—and if there were, it would be of no value. If there is a value which is of value, it must lie outside all happening and being-so. For all happening and being-so is accidental. What makes it non-accidental cannot lie in the world, for otherwise this would again be accidental. It must lie outside the world (Wittgenstein 1922: 87–88)

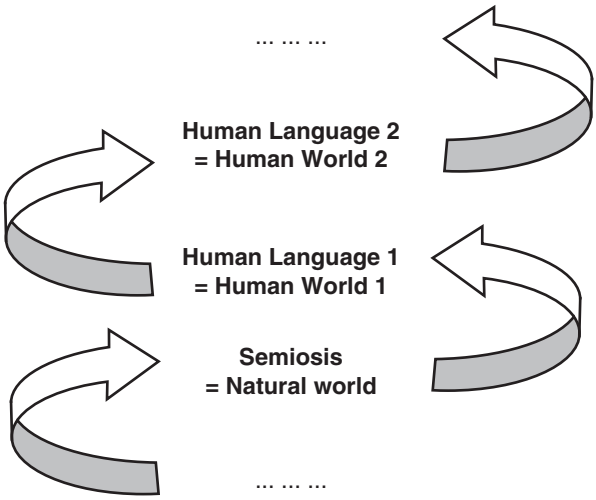

Fig. 9.2 The evolutionary spiral of human language

This space beyond language, which can only be thought from *within* language, is precisely the space that justifies and grounds language itself, since "[t]he sense of the world must lie outside the world". Indeed, language is not one with the world, as in an idealist construal (if someone has ever really held such a thesis) according to which language creates the world, being its very substance. The evolutionary identity of language and world that Prodi insists upon is not a form of absolute idealism. Language is inscribed within the world, derives from the world, and is a part of the world (and Fig. 6.2 clearly illustrates this point). The meaning-bearing relation *AB* can be established only because other things—*C*, *D*, and *E*—remain indifferent (this space of indifference is the "darkness"). The non-semiosic world is always wider than the semiosic one. Semiosis means selection, in the context of "categorial logic", and hypothesis, in "propositional logic":

> [t]he formulation of hypothesis only develops in man, and characterizes his epistemic process. It allows to imagine possible states of reality, based upon of data gathered according to the same logic (an extension of material logic) that they followed while being assembled. The individual de-assembles and recombines these data, finding a best fit with reality […]. The result are constructions that can be compared with reality — possessing a certain degree of analogical correspondence with it — through processes of translation: in this sense internal representations are also signs, and can be translated into communicable signs. These constructions can be arranged not only according to reality, but also to other strata, completely detached from reality, to be taken as reference points. (Prodi 1977: 132)

Prodi is here telling us that hypotheses are not the result of an inexplicable creative act. As we have already seen, when "a sensorial entity, instead of following its relatively fixed groove, enters into the sea of language" (Prodi 1987b: 217), this stimulus enters into an indefinitely extended combinatorial space, within which hypotheses can be formulated. The hypothesis is nothing but this reverberating of the incoming stimulus between the nodes of the internal network of language. Thus, the hypothesis—as an experimentation of possible combinations of data from the internal

deposit—breaks the closure of the environment, making it possible for the consciousness of boundaries to emerge. As a matter of fact, the discovery of "darkness" means that the world does no coincide with language: in this sense, we can say that hypothesis—at the origin of aesthetic experience and of the sacred—is an intermediate state between "incapacity and desire" (Prodi 1987b: 217) and represents the most proper human experience, pertaining to the "problem of the boundaries" (Prodi 1987b: 217) of our world. Language as hypothesis institutes the separation between environment (the one in Fig. 4.2, that is to say the closed space of the animal's "functional circle") and human world. The human world is composed of both the linguistic environment and the "darkness"—the world is real just because language is *not* everything:

> [i]t is precisely the hermeneutic weakness of language that allows the world to be a "world". Only when the word shows its powerlessness to decode the non-linguistic can the latter domain present itself as a context that cannot be transcend — thus constituting a *world*. Somewhat paradoxically, we could say that *the world is linguistically constituted by that which, within language, betrays the incomplete or limited nature of language itself with respect to the world*. Ultimately, the fact that men have a "world" (wherein merging is always imperfect, conflicts are always unresolved, and adaptations are partial and precarious) instead of an "environment" (into which organisms as irrevocably integrated, as if immersed into an amniotic fluid), is explained by the limits of language rather than by its representative power. (Garroni 1986: 263)

We can once again return to Wittgenstein's famous proposition "[t]he sense of the world must lie outside the world". This means that this gap between internal and external, between language and nonlanguage, determines the conditions for another paradox: that proper of those who, from *within* the world/language, aim to grasp that which lies outside the world—an ambition accompanied by the clear and tragic awareness that this step towards the outside will forever remain logically impossible. From this point of view, *we are* this paradox: our very essence as human animals is distilled in this condition of suspension, this substantial "perplexity" (Prodi 1987b: 217)—our being "radically dark to ourselves" (Prodi 1987b: 216). This is not a paralyzing paradox though: on the contrary, it represents the fundamental push that, operating from within the world/language, propels the continuous attempt to extend and transgress its borders. This is the opposition that the Italian philosopher Emilio Garroni (one of the most important Italian philosophers active while Prodi was developing his own biosemiotic model) examined in his *Senso e paradosso*, pertaining to an experience that, on the one hand, "run[s] against the boundaries of language" (to use Wittgenstein's phrase [see Chap. 10]) while, on the other, can be meaningful only insofar as it runs against such boundaries. Human language can signify something only because it cannot signify *everything*:

> [a]s I see it, the irrational is not defined by its opposition to the rational, but it rather indicates the whole ensemble of things, only a very limited part of which we can rationalize. It produces knowledge and, eventually, consciousness. The irrational is therefore a large container: there is always more that can be said about it, but it still remains a container in principle unobservable for us from the outside, always imposing limits on us which we see as boundaries and foreclosures. Beyond these borders, there are unrecognizable lands. (Prodi 1987b: 213)