Being-for.
Purposes and Functions in Artefacts and Living Beings.

Luca Illetterati

1. INTRODUCTION

In everyday discourse, we talk about purposes and functions in quite different contexts: for instance, we refer to the functions of social institutions as well as to those of artefacts and of biological entities. The problem to be discussed here is whether such notions as purpose and function can be conceived independently of the domains and regional ontologies to which they are applied. Or whether the different scopes within which such notions perform an explicative role (sometimes, an identifying task with respect to certain objects) entail different ways of thinking about the *being-for* they express. We can claim of a pen, for instance, that its function is to make writing possible; that a local police officer's function is to keep urban traffic under control; and that the heart's function is to pump blood, thus producing sufficient pressure to allow for the circulation of the blood. The question is: Are we referring to a unique notion of function in the three aforementioned situations, since in each case the *being-for* of these different entities is at issue? or: does the specificity of the fields and of the ontological regions to which we are referring entail a difference in our understanding of the aim or function of these different objects, and therefore, of the *being-for* pertaining to each of them?

2. THE QUESTION IN THE CURRENT PHILOSOPHICAL DEBATE ON FUNCTIONS

Most of those who debate functions nowadays seem to agree that the notion of function is a univocal one, applicable to different areas, albeit via quite different approaches. According to this position, the logical structure of function does not depend on its spheres of application. On the one hand, it is quite obvious that, when we talk of such artefacts as the pen, of such social roles as that of the local police officer, or of such biological entities as the heart, we are speaking of different objects. On the other hand, these

objects would share a common functional characterization, with respect to which (and obviously, only from this viewpoint) they appear as entities possessing the same modality of being: the pen, the local police officer, and the heart, are recognized *as* such because they are all identified as being a *being-for* in the first place, and this is something determined with respect to the purpose of its action, or the function it performs.

In this sense, taking an aetiological approach to the issue of function—one that aims to provide a causal explanation of function as a past effect selected by the historical, evolutionary process—L. Wright proposes a *unitary* definition of function, holding both for natural beings and for artefacts (Wright 1973). According to Wright, this does not mean that there are no differences between a natural being and an artefact; rather his proposed notion of function is not affected by the features of the different classes of entities to which it is ascribed.

Within this approach, the definition R.G. Millikan gives of *proper function* is that in order for an object A to have a function F as its proper function, it is necessary that: (1) A be originated as a reproduction (a copy, or a copy of a copy, etc.) of preceding items which, partly *because of* their possessing the properties which are transmitted, have performed function F in the past; and (2) A exists because (a historical and causal 'because') such items have performed F (Millikan 1984, 1989). Such a definition refers indistinctively to social and biological entities as well as to artefacts.

The same can be observed of the dispositional perspective *à la* Cummins, an approach typically contrasted with the aetiological one. For this model to ascribe a function to something is to ascribe a capacity to it which is singled out by its role in an analysis of some capacity of the system which contains that thing. The aetiological approach aims to explain the presence of the function on the basis of the causal history of the item to which it is ascribed. In this case, on the contrary, the focus is on the effects of the functionally characterized item on the overall action of the system (Cummins 1975). Within Cummins' treatment functional ascription always takes place with respect to a system with no further characterization. Despite Cummins' radical departure from the aetiological approach, his treatment also dismisses, somehow *a priori*, the artefactual, social or biological constitution of the relevant system. One may even claim that Cummins' model appears to be less problematic than the one Wright and Millikan propose, where reference to the selective history spells trouble—intuitively at least—in the artefact case.

D. Dennett's notion that function (whether of an artefact, or of an organism) entails a 'design stance' is, at least for the aspects discussed here, even more radical. This concept involves the idea that functionally characterized objects have been conceived and planned. Evidently, such a reference to design does not necessarily involve intentionality, for according to Dennett, in the case of natural beings we are facing an unintentional design tracable to the evolutionary forces of nature (Dennett 1996). Interestingly, apart from the fact that in the case of artefacts the agent operates purposefully whereas natural design is unintentional, the explanation underpinning this understanding of both the way of being of artefacts, and the natural way of being, seem to be the same.

A. Plantinga's approach does not distinguish the notion of function according to the different domains to which it is applied, but also, in some sense, it bases its argumentative force precisely on linking the characteristic functions of artefacts to those of natural beings. According to Plantinga, the existence of functions in nature is proof of the existence of an intelligent designer: since only a designer could justify the presence of such functions, for the artefact case shows that these are products or consequences of intentions, therefore of a designer's projects. Just as a functionally characterized artefact corresponds to a design plan, so too are organisms and their parts the products of specific design, insofar as they are functionally characterized. Therefore it is possible to attribute proper functions to natural beings, only if they perform such functions by conforming to how they have been planned by the designer (Plantinga 1993).

Plantinga's position may be simplified as follows:

1. If one grants that actually there are proper functions of natural beings
2. then, proper functions exist only as the products of intentional activity—therefore, of a designer,
3. it is necessary to admit, as for the functions of an artefact, some form of intelligence behind natural functions, to account for their existence.

Now, most positions within the current debate on functions follow a naturalistic stance by trying to account for functions and the teleological features they entail without referring to an intentional model necessarily leading to such a position as the one advocated by Plantinga. However, the notion of function at issue in the different naturalistic explanations—be it the

aetiological position of Wright, Millikan or K. Neander, or Dennett's design stance and P. Kitcher's design theory for functions (also see Kitcher 1993)—is indifferently applied to both the domain of artefacts and biological entities in all cases.[1]

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[1] For a classification of the positions within the contemporary debate on teleology and functions performed by dividing them into extra-naturalistic, naturalistic and quasi-naturalistic categories, see Perlman 2004. He subdivides the so-called *non-naturalistic* position into two versions or subclasses: the *metaphysical non-naturalism* and the *religious non-naturalism*. In the first case—which originates from a platonic model—everything aims at *perfection*: a transcendent idea with respect to that thing, and the model of the thing itself. In the second case, the existence of a purpose in nature is not assumed as something requiring explanation; rather as a sort of datum which should lead to the admission of a supreme being as the origin of purposes and functions in nature. In opposition to these non-naturalistic conceptions (undoubtedly a minority, and disregarded by some), Perlman shows how most contemporary theories are characterized by a *naturalistic* approach. This kind of approach is determinable by the attempt to explain the employment of such notions as purpose and function with no appeal to principles transcending nature. However, within this kind of approach we find very different positions. In particular, it is possible to distinguish: 1) a *reductionist* tendency, holding that it is possible to translate teleological speech into non-teleological speech without losing any information produced in the former; 2) a radicalization of the reductive naturalism Perlman calls *eliminativism*, which considers teleology not only as being reducible to any mechanisms, but as simply an illusion; 3) a *non-reductionist* tendency which tries to save the possibility of teleological speech by claiming that it will be never completely translatable into a non-teleological speech involving reference to neither transcendent metaphysical principles, nor alternative models of causality. Between non-naturalistic and naturalistic positions Perlman inserts an approach he calls *quasi-Naturalistic*, which he identifies with the Aristotelian theory of biological functions and with the so-called *emergentist* positions. According to this approach, even if functions are somehow reducible to the physical properties of an object, this does not mean, as reductionists claim, that functions are not real but 'emergent' properties supervening the relations between the physical properties of the object. Actually, calling these positions 'quasi-naturalistic' appears to be a means of underlining the ambiguity that could be their main feature. Perhaps one had better not consider these positions as naturalistic at all, but in a strong antireductionist sense; i.e., as positions which try to conceptualize functions as real properties without considering them as physical properties, and without making reference to a transcendent entity to justify their presence as real. For other attempts to provide taxonomies in the modern debate on functions see Wouters 2005.

3. A COMMON PRESUPPOSITION OF THE DIFFERENT POSITIONS?

Now, such reliance on a unique notion of function for both the artefactual and natural case is apparently based on the precise assumption that: functions are the products of an activity which is extrinsic with respect to the object to which it is ascribed. In other words, functions refer to something external to the functionally characterized entity—be it the activity of an intentional agent, or selective history, or the unintentional design of the evolutionary forces of nature.

To put it another way, both the aetiological and the design stance explanation attribute to history, and to the design produced by selective processes, the same role given to intention in the explanation of purposeful actions. Lacking such an antecedent element, any discourse on purposes and functions faces the classical problems of backward causation, with something coming later (the goal) causing something coming earlier (the functionally characterized object).

4. THE PREDOMINANCE OF THE ARTEFACT MODEL

It is well known that reference to intention, taken as the causal element in the form of the mental anticipation of the goal, apparently solves the problems in attributing purposes, for instance, to artefacts. Therefore it may be claimed that what allows us to say that the ontological status of the pen is linked to its function is the fact that if we identify a pen as such via its function, then the pen is taken to have been produced *in order to* achieve a certain goal; we find in the pen an intention (preceding the object) which is not in the object as such, but has its place in the designer and producer of the object, and in those who recognize in it the designer's intention.

Also in the case of natural entities, there are three ways to avoid backward causation problems: first, one may think of them as related to a designer capable of accounting for their functional characterization. Otherwise, if one wants to avoid such a line, one may find an antecedent element to causally explain the functional characterization of the entity. Finally, one may discard the problem by bringing functional ascription back to the mere analysis performed by a subject on a certain system.

The aforementioned naturalistic explanations of function attempt to conceive *natural being* without admitting an intentional agent external to nature as the causal factor capable of accounting for the function itself. The

mandatory antecedent is radically different, in that it transcends neither the naturalistic element, the past history of an entity, nor the design determined by the selective processes. However, it has the same causal role of intention in the explanation of the function of artefacts or goal-oriented actions.

In this sense, one may claim that naturalistic explanations of functions share a feature with supernaturalistic ones, concerning the fundamental structure of the notion of function: the idea that organic functions can be explained the same way as artefactual ones: by resorting to an external causal factor.

Both the aforementioned naturalistic readings, and Plantinga's 'non-naturalistic' position (due to its strong theological and metaphysical commitment) share what has been called an *artefact model* of nature (Lewens 2004, 2) which takes nature to be the product of either an intentionally oriented designer, or something acting *as* a designer, albeit unintentionally.

Despite the claims of Plantinga (and those philosophers and theologians who exploit the teleological argument for the existence of God as an explanation of world regularities), the artefact model of nature can be taken as a mere *methodological* attitude—therefore, as a heuristic strategy. This way, one could avoid the classical charges of anthropomorphism advanced, for instance, by Spinoza and Hume, against such a way of understanding nature. The assumption of the artefactual model—that is, of the explanatory structure underlying the hermeneutics of artefacts—as the methodological model of natural inquiry, however, is not neutral with respect to the way of being of nature itself, unless we believe that such a model merely illuminates a construction of the interpreting subject, with no link to the actuality of what is interpreted. Therefore, either we think that assuming the hermeneutics of artefacts as the paradigmatic way to understand nature somehow reflects the way of being of nature itself (which nevertheless entails that nature is actually taken as resulting from a productive or constructive process analogous to the one underlying the production of a technical item); or, if we want to avoid reaching such a conclusion, we have to admit that the results conveyed by the assumption of such a model are nothing but mere subjective constructions, having nothing to do with the way of being of the reality one is investigating.

Consequently one of the implicit difficulties in indistinctly assuming a unique notion of function both for artefacts and for biological entities, emerges at this level: if, on the one hand, the *being-for* of artefacts appears

to be reducible to an intentional element constituting their causal features, on the other hand, the *being-for* of biological entities is explained by finding in them either an intention (which has to be a transcendent intelligence's, so that the argument is moved to a level which entails a peculiar theological and metaphysical commitment), or something that should act as an intention, without being intention.

5. IN DEFENCE OF A DIFFERENCE BETWEEN NATURAL TELEOLOGY AND THE TELEOLOGY OF ARTEFACTS

The characteristic *being-for* of artefacts, contrary to mainstream theories, is based upon a structure which is irreducible to that underlying the *being-for* of the organs of living beings. Our primary conviction is that only by clarifying such a difference can one avoid the assimilation of the way of being of living beings to that of artefacts (as happens when artefacts are thought of as peculiar, as Plantinga's divine artefacts are for example), and also the consequences of a framework within which living beings are viewed metaphorically *as if* they were artefacts, in order to escape from the radical consequences of a strongly theological and metaphysical commitment, despite the awareness that they cannot be such in the same sense as those whose origin is recognized in intentions.

In order to conceptualize the difference between the artefactual notion of function and one appropriate for the way of being of living beings, we shall rely on the distinction between *internal* and *external* purposiveness Kant proposes in the *Critique of the Power of Judgement*. This recovery will clarify some inherent tensions within the Kantian transcendental framework, and these tensions will assume paradigmatic value with respect to the issue of thinking about the functions and purposes of artefacts and living beings differently. As we shall try to show, on the one hand the Kantian distinction between internal and external purposiveness allows for the adoption of two different models of functional attribution with respect to artefacts and living beings; on the other hand, the purely regulative value Kant assigns to purposiveness with respect to the inquiry into the natural world seems to be justified on the basis of a teleological model related to artefacts as the unique and real model within which purposiveness reveals

some proper features of the mode of being of the functionally characterized object.[2]

In this sense, we will try to establish the feasibility of overcoming the transcendental perspective's tendency to assign a merely regulative role to natural purposiveness, in order to begin to recognize the constitutive role of purposiveness in nature, without having to justify it via supernatural entities.

6. ORGAN AND INSTRUMENT

Let us return to the artefact model of nature or, more precisely, to the fact that when we talk of organisms, and of organic parts from the viewpoint of the whole they constitute, avoiding what Lewens calls the phenomenon of *artefact talk* in biology seems impossible. In many respects the idea of an artefact model of nature, or of an artefact model in the consideration of the living world, seems to be entrenched in ordinary language. Actually when we talk of living beings, we take them to be organisms, that is, organized structures unifying a multiplicity of organs or *instruments* whose task consists in performing determinate functions.

In the *Critique of the Power of Judgement*, Kant explains the concept of *organ* by reference to that of instrument. Since for Kant an organism is an *organized* and *self-organizing* being, where "each part is conceived as it exists only *through* all the others" and "*for the sake of the others* and *on account of* the whole". Therefore each part of an organism must be considered as an instrument (*Werkzeug*) "that *produces* the other parts (consequently each produces the others reciprocally)" [*Critique of the Power of Judgment* (hereafter: CPJ) 373-374 (245)].[3]

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[2] Within our discourse, which aims to distinguish the artefactual way of being from that of biological entities, we shall not take into account such artefacts as *artworks* since their ontological status is not reducible to a general ontology of artefacts; on the contrary, it should be taken—again, following Kant—as lying on the boundary between the ontology of artefacts and that of living beings.

[3] Citations from the *Critique of the Power of Judgment* ('CPJ') will be located by page number as in volume V of the so-called *Akademie* edition, *Kants gesammelte Schriften*, edited by the Königlichen Preussischen [now Deutschen] Akademie der Wissenschaften (Berlin: Walter de Gruyter, 1902-). Citations from the so-called *'First Introduction' to the Critique of the Power of Judgment* ('FI')

According to Kant, an organ is a highly peculiar tool. Unlike the instruments mentioned within the artefactual approach, organs do not refer to something external as the source of their subsisting: they *are* organs, precisely *because* they produce themselves and the other parts that also perform an instrumental function within the living organism—and here 'organism' cannot mean anything of organs. Kant underlines this peculiarity when he claims that the self-productive capacity of the organism's organ "cannot be the case in any instrument of art" [CPJ, 373-374 (245)]. This claim is extremely significant within the general Kantian strategy. If one affirms that an organism is nothing but a bunch of instruments, Kant's aim to identify the features that distinguish the way of being of organisms from that of mechanisms, and make it irreducible to the way of being of artefacts would be obscured. However (and this is one of the many tensions characterizing the Kantian point of view), the very notion of the organ explained as an instrument, like the characterization of natural beings as 'products of nature', seem to point (even beyond Kant's intentions) to the sphere of man's produce or technical products, the world of *artefacta*, that is, precisely to the domain Kant invokes by distinction to living organisms.

Therefore when we try to grasp the notion of *organism* in its constitutive elements, it refers us to words, concepts, and to a categorical apparatus, all of which seem to obtain their meaning from the typical conceptualization of the world of artefacts. Consequently this seems to produce the phenomenon of artefact talk in biology, which in turn appears to presuppose an implicit (if not unconscious) assumption of an explanatory model entailing reference to intentions, or to something like intentions.[4] In fact,

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will be located by volume (XX) and page number from the *Akademie* edition. Citation from *Metaphysical Foundations of Natural Sciences* (MFNS) will be located by volume (IV) and page number from the *Akademie* edition. The translations are taken from Paul Guyer and Eric Matthews' edition of the *Critique of the Power of Judgment* (Cambridge: Cambridge University Press, 2000) and the Gary Hatfield, Michael Friedman, Henry Allison and Peter Heath edition (*Theoretical Philosophy after 1781*, Cambridge: Cambridge University Press, 2002). The pagination of translated editions will be bracketed.

4 The idea of an unconscious metaphysics underlying the development of natural sciences is also Kantian. In *Metaphysical Foundations of Natural Sciences* Kant makes the well-known claim that each natural science necessarily entails a metaphysics of nature. Now, whereas natural science is the inquiry into an object of

instruments are something *useful for*; their general ontological determination consists in their *being something for*. Precisely because they obtain their meaning from their *being something for* and therefore from their *being useful in order to*, instruments appear to share the status of *technical products*: something made (thought, designed or built) for something else. Products are objects deriving from a process of production, that is, not only from a building process, but also from a level determining (a *design*) since what the product is made for is prior to the cause and is its reason for being or existence. Products are *produced for*, designed and built *in order to*.

7. THE DIFFERENCE BETWEEN ORGAN AND INSTRUMENT

Taking organs to be instruments seems to lead us to derive a series of consequences from the concept of organ, ones which are apparently difficult to preserve, and this in turn leads us to the artefactual perspective. For this reason we should consider whether we are *positively* allowed to say that the organs of an organism are not instruments, and in what sense the *being-for* underlying the structure of instruments as technical products can be distinguished from the *being-for* of the organs of an organism. A possible strategy for distinguishing these two forms of *being-for* is to identify what the *being-for* of the organ is directed to, and the aims of the *being-for* of the instrument.[5]

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experience within nature, the metaphysics of nature has to do with the notion of nature in general—that is, with the conditions and presuppositions by means of which natural sciences are capable of studying nature itself as something given. Natural science usually rejects the idea that its inquiry may have metaphysical by-products; but according to Kant this does not mean that it can dispense with metaphysics. Rather, it means that science exploits metaphysics *unconsciously*: "all natural philosophers, […], made use of metaphysical principles (albeit unconsciously), even if they they themselves solemnly guarded against all claims of metaphysics upon their science" [MFNS, 472 (187)].

[5] In this section, we shall follow Martin Heidegger, who took up the issue in a course entitled *The Fundamental Concepts of Metaphysics. World, Finitude, Solitude*, given in 1929-30. It is devoted largely to the attempt to unfold the fundamental ontological differences between the organic, inorganic, and human, via analysis of the different ways in which these three modes of being relate to the world. Hence it follows the discussion of the three famous Heideggerian theses:

The first feature to emerge from such a comparison is that: although the *being-for* of the organ and the instrument are both translatable into an activity oriented towards some entity, it is the kind of relation towards such an entity that makes the difference. If, on the one hand, the instrument appears to be self-subsistent, not being a part of what makes use of it, on the other hand, the organ of the organism seems to be incapable of self-subsistence, being tied to the organism of which it is a part. Unlike instruments, organs are always included in the subject to which their *being-for* is directed, so much so that beyond such relations the organ is no longer itself. That a given organ can be transplanted from one organism to another is irrelevant with respect to the connotation of organs as things which, unlike instruments, are what they are only by virtue of being *included* in what uses them. Even in transplants, it is the *incorporation* itself that makes a transplanted object an organ. An organ is what it is only insofar as it remains within the organic structure; outside of the organized structure the object, which finds its characterization in the specific *being-for* affecting it, is no longer an organ, because it lacks the *being-for* which individuates it as a particular organ.

8. CAPACITY AND BEING READY-MADE

Heidegger attempts to *positively* characterize the difference between the aims of the *being-for* of the organ and that of the instrument, by using two words that underline, both the impossibility of an organ subsisting outside of the structure constituting its own condition of possibility, and, the possibility of the instrument subsisting independently of its support. Accordingly, whereas the *being-for* of instruments is made explicit in what can be defined as their *Fertigkeit*—their being ready-made for something—the *being-for* of organs entails a *Fähigkeit*, or a capacity which does not belong in the organ as such, but in the system within which the organ is embedded (Heidegger 2001).

Heidegger's terminological distinction is worth consideration, for it appears to express the different ontological structure of entities characterized by *Fertigkeit* (that is, instruments as artefactual products), with respect to

a) the stone is worldless; b) the animal is poor in world; and c) man is world-forming.

those characterized by *Fähigkeit* (that is, the organs of an organism: entities whose existence depends on their being included in that system of connections—an organism—which itself exists only because of the organs constituting it). According to Heidegger, the term *Fertigkeit* points to the instrument's being ready-made for some function—a function that, in order to be activated, requires an external subject actually turning it on, so to speak. By using such a term, *Fertigkeit*, and by playing with its connection to the adjective *fertig*—indicating in German the ready-made nature of something in the sense of its being finite, completed and concluded—Heidegger underscores the ontological status of artefactual instruments. They are precisely *products*: things whose being depends on a plan, a process of construction in which some project is executed, a project that has pre-determined the object's function. Such a function will only become concretely active however, when the building plan of the object and the process of its production have come to an end, and therefore it must be concluded (*fertig sein*) in order to be at someone's disposal.

In this sense, the *being-for* of the instrument is always subject-oriented, and the subject to which it is oriented is structurally distinct from the instrument itself. On the contrary, the *being-for* of an organ is directed towards the system itself, its circular structure is at once the product of the reciprocal action of the organs, and the condition of possibility of its being as organs.

9. ORGANS AND INSTRUMENTS AS PARTS OF A SYSTEM

Therefore organs and instruments relate differently to what their *being-for* is directed at. Organs make their *being-for* explicit only with respect to an environment, which is also the condition of possibility of their being organs, of their being those determinate *being(s)-for*. At the same time, the environment itself (the organism), being the condition of possibility of the explication of the organ's action, has in organs and in their mutual connections the condition of possibility of its own existence, so much so that it is possible to claim that organs are *constitutive* of the system in which they act. Lacking the activity of some of its organs, the system itself undergoes changes that can be decisive with respect to its survival.

There is no such relationship in the connection between an instrument and those who use it. There the instrument *is*, only insofar as someone uses

it (a microphone actually is a microphone only insofar as someone uses it for the function for which it was built); however, there is no apparent relationship of reciprocal entailment between an instrument and those who use it concerning the respective existences (their enduring being). Thus, whereas an organ has a constitutive function with respect to the subsistence of the system in which it is embedded, and the system itself is a condition of possibility of the organ, the same thing cannot be claimed of the relation between instruments and those who use them.

In this sense, the *being-for* underlying the way of being of organs, and the *being-for* underlying the way of being of instruments, reflect different ontological structures for these kinds of entities. They are both functionally characterized, but in such a shape that the former's way of being cannot be superimposed upon the latter's.

10. INTERNAL AND EXTERNAL PURPOSIVENESS

Kant separates the *being-for* of an organ, which depends on a reciprocal relation with the subject to which its *being-for* is directed (so that its *being-for* has a constitutive role with respect to the possibility of the existence of that subject), from the *being-for* of the instrument, which derives from an external subject, towards which it plays no constitutive role, via the distinction between a) *internal* and b) *relative* or *external purposiveness*.

Kant opens the *Analytic of the Teleological Power of Judgement* with a well-known distinction between these two ways of understanding purposiveness, which he discusses in relation to nature: external and internal purposiveness or, a relative purposiveness of nature and "an internal purposiveness of the natural being".

Relative purposiveness takes place when an entity or a natural event appears to be oriented towards something else's utility.[6] This is external purposiveness, since the possibility of a goal refers to something else, distinct and external with respect to the being to which the purpose is ascribed.[7] In

[6] More precisely, according to Kant, relative purposiveness can be called *usefulness* (*Nutzbarkeit*) when referred to human beings, and *advantageousness* (*Zutraeglichkeit*) when referred to any other creature.

[7] "By external purposiveness I mean that in which one thing in nature serves another as the means to an end" [CPJ, 425 (293)].

Kantian terms, purposiveness in this case, is "contingent in the thing itself to which it is ascribed" (here Kant refers to natural beings, for example, a vegetable providing sustenance to an animal is therefore a target *with respect to* the subsistence of the animal) [CPJ, 368 (240)].

For Kant, such purposiveness (the external kind) cannot perform an explanatory role to aid the scientific consideration of the natural world. On the contrary, its clarification allows Kant to part from the anthropocentric teleology criticized by Spinoza or Hume, or from cosmic teleology, making the kind of progression towards perfection Ernst Mayr describes (Mayr 1982).[8]

Internal purposiveness, to which Kant attributes an explicative capacity in our consideration of nature, takes place when a single thing is simultaneously "cause and effect of itself" [CPJ, 370 (243)]; when, that is, an object's goal is linked to the nature of the object: what it aims at is nothing separated from it, but the realization of what it is. In this case, something's being a goal does not depend on anything else (that is, not on another separate, independent entity); it is connected to the thing's way of being.

According to Kant, a natural product exists as a natural end (*als Naturzweck*), only "*if it is cause and effect of itself*"; the products of nature that manifest this characteristic, and can therefore be considered as natural ends, are living beings. According to Kant, a living being can be both cause and effect of itself in at least three senses:

(a) first, with respect to the species, in the sense that an organism, by producing another, "continuously preserves itself, as species" [CPJ, 371 (243)]: it is, therefore, both a cause and an effect of the survival of the species;
(b) second, with respect to the *individual*, in the sense of *growth* (*Wachstum*), that "is to be taken in such a way that it is entirely dis-

[8] It is clear, then, that this distinction is absolutely fundamental for Kant: it is the sole means by which the Kantian retrieval of purposiveness apparently escapes the general critique of teleology underlying the birth of modern science. The discourse on natural purposes is taken to be the by-product of an anthropomorphic view of the world, so that the latter is interpreted just as men interpret their products. This criticism strikes at the teleological consideration of nature based upon *external* purposiveness.

tinct from any other increase in magnitude in accordance with mechanical law [*Größenzunahme nach mechanischen Gesetzen*]"; instead it is a form of generative production or generation (*Zeugung*) necessary to the development of all organisms (being thus *cause* of itself) "by means of material which, as far as its composition is concerned, is its own product" [CPJ, 371 (243)] and therefore, an *effect* of itself;[9]

(c) third, in the sense that the *preservation* (*Erhaltung*) of each part "is reciprocally dependent on the preservation of the others" [CPJ, 371 (243)], so that the parts are essential to the whole, and the whole is essential to the parts: for instance, Kant says that leaves "are certainly products of the tree" (therefore, its effects), "yet they preserve it in turn" [CPJ, 372 (244)] and are therefore causes.[10]

Such features—the ways in which organisms's being manifests both cause and effect of themselves—determine the characteristic way of being of living things and, consequently, are also the aspects which distinguish the ontological structure of natural beings from that of mechanical products as conduits for skill.

In fact, a machine—taken as the paradigmatic technically and artificially structured and organized product—cannot produce another machine via the self-organization of its matter, just as it cannot, *by itself*, replace its own parts or modify its arrangement spontaneously. More importantly: whereas a machine can be the instrument for the movement of other like

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9 "For although as far as the components that it receives from nature outside of itself are concerned, it must be regarded as only an educt, nevertheless in the separation and new composition of this raw material there is to be found an originality of the capacity for separation and formation [*Scheidungs- und Bildungsvermögen*] in this sort of natural being that remains infinitely remote from all art [*Kunst*] when it attempts to reconstitute such a product of the vegetable kingdom from the elements that it obtains by its decomposition or from the material that nature provides for its nourishment" [CPJ, 371 (243)].

10 This is a very interesting point within Kant's argument: the capacity of being both cause and effect of itself in the last sense is at the basis of the extraordinary capacity (owned only by living beings, and distinguishing them even from the most complex artefacts) of fixing possible deficiencies via a transformation of the functions of single parts in order to preserve the whole organism. This capacity can lead to the development of completely novel forms of life, and also to quite odd creatures: see CPJ, 372 (244).

machines, but never the efficient cause of their production, each part of an organism has to be thought of "as an organ that *produces* the other parts", so that each part produces the others reciprocally [CPJ, 374 (245)]. In other words, whereas in a mechanism "one part is certainly present for the sake of the other but not because of it" [CPJ, 374 (246)], in an organism "as an *organized* and *self-organized* being", each part can be considered "only *through* all the others" and "*for the sake of the others* and *on account of* the whole" [CPJ, 373-374 (245)]. The parts of organisms are what they are only in their relationships with other parts within the whole and, at the same time, the whole is what it is only in its connection with the parts.

11. THE (UNKNOWABLE) PRINCIPLE OF THE SELF-ORGANIZATION

According to Kant, organized products of nature, such as living organisms, resist mechanical explanations, not because such explanations cannot clarify how parts and organs work, but because they cannot account for the specific connection between the parts and the whole characterizing natural beings. Mechanical explanations, despite being—as we shall soon see—the only explanations Kant holds as deserving to be called scientific cannot account for what appears essential and typical in the way of being of natural entities: the principle of *organization*. On the contrary, since the self-organization of living beings—that '*formative* power' owned only by products organized by nature—is for Kant an 'inscrutable property' [CPJ, 375 (246)], such a structure not only allows, but *requires* a finalistic principle from our cognitive faculties. This justifies those interpretations which resort to finalism when they interpret this not as Kant's attempt to provide an autonomous scientific foundation to the science of living being, but evidence of his attitude of "epistemological 'deflation'" with respect to 'biomedical' sciences (Zammito, 2006). We should be aware that such a principle—the concept of a thing as in itself a natural end—should not be considered as a constitutive notion of determining judgment: it is only "a regulative concept for the reflecting power of judgement". In other words it is a concept employed "for guiding research into objects of this kind" [CPJ 375 8247)], without aiming to make the intimate constitution of such objects explicit.

12. ORGANISMS AND ARTEFACTS

In the *Critic of the Power of Judgment,* Kant uses the difference between internal and external purposiveness to sho both the pointlessness scientific accounts of nature, of teleological principles based upon *external* purposiveness (as they occur within the various forms of anthropocentric and cosmic teleology), and, the possibility of resorting to a teleology based upon *intrinsic* purposiveness in the consideration of organized products of nature, albeit mainly with a regulative and heuristic function. Kant also posits a difference between natural and technical products on the grounds of how they can be seen as organized structures. Whereas the structure of natural beings is *self*-organized and *self*-organizing, the organizing principle of artefacts is always external to the products themselves. Similarly, whereas the living product of nature is characterized by a self-realizing activity (which is why we are allowed to talk of *internal* purposiveness), artefacts always point at something external, by finding their target (which identifies them as what they are) in something different from themselves; thus they are characterized by an *external* purposiveness.

Such a fundamental difference between the organized products of nature, characterized by self-absorbed processes and activities aiming at their own self-subsistence, and technical products whose goal lies outside of them, can be made evident via the notion of metabolism, for instance (Jonas 1966). If metabolic process shows only the dependence of an entity on a source of energy which allows it to endure through time (thus not marking a difference between living beings and artefacts), metabolism *within* organisms is not limited to this: it consists in an interdependence between the exploitation of energies and their preservation, between the growth, the development, and the conservation of the living body. Such interdependence distinguishes organisms from artefacts, and more specifically, biological from (so-called) artificial life (Boden 1999). Metabolism allows an organism to feed itself by taking the required energy from external sources, and consists in the continuous process of restoration of matter within the organism itself. In order to endure as a living being, any living being, independent of its size and its degree of complexity, must demolish and rebuild its constitutive ‘materials’ via metabolic activities of assimilation, transformation and elimination.

In other words, the way of being of living entities entails their continuous transformation in a self-directed process in which organisms act on

themselves—and towards the environment—with the aim of *enduring as* processes, or being what they *already are*. Therefore the metabolism of living beings is not the same as the activity of capturing energy performed by a machine. Fuel does make a machine work but metabolism isn't just this. Through metabolism, organisms show themselves more as a system which is perpetually the result of the very same process it institutes within itself as well as with its surroundings. A living being is the product of a process by which organisms 'build' themselves, not only by feeding their constitutive parts, but also renewing and substituting them by and for themselves.

13. THE DIFFICULTIES OF THE ANALOGIES BETWEEN MACHINES AND LIVING BEINGS

The distinction Kant proposes between internal and external purposiveness, ostensibly confounds a superposition between natural and artificial products. The *being-for* of artefacts is always related to an external, independent entity, and this displays a logic of the *being-for* which cannot be identified with the one to whom the *being-for* is directed, as a matter of fact, towards the *being-for* itself.

For this reason, Kant stresses all the difficulties of comparing living beings and the way of being of artefacts (even analogically), as follows:

> One says far too little about nature and its capacity in organized products if one calls this an *analogue of art* [Analogon der Kunst] [CPJ, 374 (246)].[11]

According to Kant, when we compare the way of being of the organized products of nature with arts and techniques, we have already transformed living beings from self-organizing products into entities related to a designer, a rational being separated from these products, and provided them

[11] In the initial paragraphs of the *Introduction*, Kant distinguishes the principle of *natural* purposiveness from that of *practical* purposiveness, be it the properly technical one ('of human art', as he claims), or the one related to human action (moral). However, in the very same context he acknowledges that even though the principle of natural purposiveness cannot be taken as identical to practical and technical purposiveness, natural purposiveness is "certainly conceived of in terms of an analogy of that" [CPJ, 181 (68)].

with their characteristic internal structure. To think of the organized products of nature as analogous to artefacts would mean to overlook their specific ontological status, that is, what makes them distinct as self-organizing beings which are both cause and effect of themselves, and consequently contain their own end.

We may approach an understanding of this self-structuring, self-producing capacity of natural beings (which remains largely unknowable) by calling it, as Kant does, an *analogue of life* (*Analogon des Lebens*). Probing the consequences of the possible analogy, Kant adds that:

> one must either endow matter as mere matter with a property (hylozoism) that contradicts its essence, or else associate with it an alien principle *standing in communion* [*in Gemeischaft*] with it (a soul) [CPJ, 374-375 (246)].

Both ways lead to a dead end: in the first case, we presuppose what we aim to explain, that is, organized matter (*and this is the contradiction immanent in any form of vitalism*); in the second case, we take the soul to be the artist (*Künstlerin*) of such a construction, thereby subtracting it from nature.

Strictly speaking (*genau zu reden*), Kant claims, "the organization of nature is therefore not analogous with any causality that we know" [CPJ, 375 (246)]. The analogy with art can work insofar as we refer to the 'aesthetical' consideration of nature, for the beauty of nature is ascribed to objects "only in relation to reflection on their *outer* intuition"; but the inner natural perfection (*innere Naturvollkommenheit*) characterizing what Kant calls natural ends, which are the organized beings of nature, cannot be reduced to any known analogy [CPJ, 375 (247)].

14. THE REGULATIVE FUNCTION OF THE NOTION OF PURPOSIVENESS IN NATURE

Kant considers the principle of internal finalism essential to understanding the way of being of living beings, yet not constitutive of living beings themselves. It is a regulative principle governing our inquiry, that is, guiding and orienting our approach to living beings. Although this principle allows us to speak of living beings' functions and purposes, it does not allow us to ascribe functions and purposes to *them*, as *constitutive* of their way of being. This is a basic point: the claim, that the self-producing structure of living beings—if thoroughly conceptualized—is irreducible to any kind of

causality known to us, forces Kant to take the notion of natural purpose as merely regulative, never constitutive.

For Kant, the teleological principle has a regulative and heuristic value linked to the reflexive judgment, never a constitutive value linked to the determining judgment. However, this holds for the application of the notion of purpose to the natural world. In some contexts, the notion of purpose does have a determining, therefore constitutive, value, with respect to knowledge of an object. When we want to understand the cause of the construction of an object, we cannot but consider purposiveness. Moreover, in the case of technical products, purposiveness assumes a decisive value. Only by beginning from the purposes of the designer can one fully understand the features of her product [FI, 251 (50)]. Technical products arise from a project, therefore, from a subject's *intention*, and are realized via a process of construction which brings to completion the subject's intention and project. In this sense, such intention—the purpose the product has for the subject—assumes a constitutive value for the product itself.

Nevertheless, the fact that purposiveness can have a constitutive value with respect to the object to which it is ascribed depends on the fact that such purposiveness (an external one) is somehow explicable according to one-directional efficient causality. Purposiveness can have a constitutive value for artefacts, because of its being explicable according to efficient causality via the recognition of the designer's intention. For Kant, to attribute a constitutive role to purposiveness in nature, *necessarily* leads to the idea of a designer. Such purposiveness derives meaning from the designer, and nature is explained by resorting to something external to it: in other words, by recourse to a principle which appears to be *transcendent* with respect to nature.

According to Kant, then, the impossibility of conceving purposiveness without reference to intention provides further justification for the impossibility of attributing any constitutive value whatsoever to natural purposiveness, and thereby for the necessity of taking it *only* as a maxim of the reflexive judgment with no constitutive value with respect to living nature. This is an aspect on which the *Critic of the Power of Judgment* never deflects (Chiereghin 1990).

To paraphrase, Kant's point is that despite the fact that organized products of nature exhibit ends and purposes (Kant sometimes claims that the purpose is *evident* in these products), we can never grasp the intention

that makes them develop according to that purpose, unless we assume an architectonic intellect *as given*, and if we do so we *lose* ourselves *in the transcendent*.

Whereas technical products always presuppose the intentionality of a subject constructing and executing the project, purposiveness within nature appears *spontaneous*, that is lacking the fundamental intentionality necessary in order to assign a constitutive role to purposiveness within technical causation. Despite the fact that purposes do seem to emerge in nature, according to Kant there is no way to prove that such purposes are also intentions. If no intention is identified, then we cannot properly talk of purposes.

15. SOME PROBLEMS ARISING THE KANTIAN POSITION

In this sense, Kant's position appears to be radically and problematically ambiguous. On the one hand, he seems to view the way of being of living things as irreducible to that of artefacts: this depends on both the distinction between internal and external purposiveness, and the idea that organized products of nature are characterized by an internal purposiveness making them inaccessible with respect to a mechanical explicative pattern based on efficient causality. On the other hand, Kant only allows a regulative and heuristic reading of the principle of internal purposiveness; therefore, only external purposiveness has real explicative significance with respect to the way of being of the object. Such a purposiveness is explicable through a linear causal pattern which allows us to speak without problems (without falling into the contradiction of the backward causation) of final causes with respect to the way of being of the artefatcs.

Kant's grounding assumption is that final causality only operates within technical and productive activity. This seems to sustain the impossibility of attributing a constitutive value to the principle of purposiveness in nature. The point is made via the claim that such attribution would somehow entail the admission of an architect, or a producer, as the only way to make sense of the constitutive value of purposiveness.

Kant aims to sharply distinguish between the way of being of the organized products of nature, and that of artefacts. However, this effort flies in the face of the fact that, if the fundamental ontological structure of organized products of nature is given by the notion of purpose, such a concept

seems to be only comprehensible within the framework of technical behaviour, and therefore, by reference to artefacts.

It is very likely that the notion of *purposiveness in nature* is variously intermingled, in Kant, with that of *technique in nature*. Kant allows the notion of technique in nature to surface at various points: generally speaking, we may claim that this concept points to the teleological procedure of nature—its proceeding according to purposes, so that, for instance, "we would call the procedure (the causality) of nature a technique, on account of the similarity to end that we find in its products" [CPJ, 390 (262)].

Therefore the technical expression of nature encourages a process "where objects of nature are sometimes merely judged as if their possibility were grounded in art" [FI, 200 (7)]. Natural beings can be described *as if* their possibility were based upon art, and therefore technique. This allows Kant to introduce an interesting distinction—also important for theories developed in the Twentieth Century—between natural products taken as *aggregates*, and natural products taken as *systems*, as Kant calls them. The process by which aggregates are formed is purely mechanical, and therefore, it is understandable by means of the *nexus effectivus*. By contrast, systems embody processes that cannot be explained in a purely mechanical fashion:

> with regard to its products as aggregates, nature proceeds *mechanically*, *as mere nature*; but with regard to its products as systems, e.g. crystal formations, various shapes of flowers, or the inner structure of plants and animals, it proceeds *technically*, i.e., as at the same time an art [FI, 217 (20)].[12]

This generates the following problems:

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[12] The subsequently developed theory to which we refer is the so-called *theory of systems*. It has been built up from its beginnings within biological sciences, especially in the work of L. von Bertalanffy, despite aiming in its successive developments at a sort of integration between the methods of natural and social sciences. Now, it is true that one can define a system as a different scientific paradigm geared to describe the laws of a 'totality' in opposition to classical science machinery and to one-directional causality (Bertallanfy 1968). However, it is difficult to avoid seeing a Kantian slant in such definitions, not necessarily entailing adherence to the whole Kantian framework.

(a) On the one hand, Kantian reflection on the way of being of living beings seems to aim to demonstrate the impossibility of understanding life through an explicative framework based upon a mechanical kind of causation, the impossibility, therefore, of conceiving the whole of nature via a mechanical approach (at least with respect to our cognitive capacities), as one can understand the way of being of a mechanical device.

(b) On the other hand, insofar as Kant conceptualizes the functioning of nature within its organized products as a *technique in nature*, he seems to think of it in terms of *production*: the operational mode in which something like a machine, or a technical product, is intelligible—something to which living beings cannot be reduced.[13]

16. BEYOND KANT

Assuming the concept of purposiveness as an epistemic principle with an essentially regulative value with respect to the inquiry of natural science, therefore denying it any ontological import, the Kantian position is inherently connected to the supposition, uncritically assumed by Kant himself, that the notion of purpose is inseparable from that of intention.

Apart from this assumption (apart, that is, from the connection between purpose and intention), the Kantian description of organized beings of nature, as beings in which each part is reciprocally an instrument and an end, describes the way of being of those natural beings that are organized as systems whose parts obtain their identity only within causal interconnections. In this framework, what plays the cause also plays the (an) effect: the system's being structured in parts actually is *both cause and effect of itself*, to use Kantian terminology outside of the regulative meaning he is forced to assign it within the presupposed inseparability of purpose and intention.

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[13] The expression 'technique of nature' plays a fundamental role in FI; its role is drastically reduced in the Introduction Kant published. This might indicate Kant's awareness of the problems faced by the corresponding concept, however, the expression remains in the published version and the the plane to which it refers is also manifestly preserved.

According to Kant, a real causal connection is made of an always-descending chain of causes and effects, so that an effect can never be a cause of its own cause. Actually, Kant admits that there is a causal pattern which, on first assessment, escapes this model, and which entails "both an ascending and a descending dependency", in which, that is, what is referred to as an effect deserves, by 'ascending', to be called a cause of its effect. This is the causal pattern that can be found in practical and productive contexts: specifically, within technical and productive actions, where the effect or purpose, produces (that is, causes) the action of what in turn constitutes the cause of that effect. If I build a chair in order to sit on it, what I reach at the end of the construction process is the possibility of sitting down, but this is also the cause of the process producing it, that is, of its own cause. This is not a problem because what comes later, the effect, is mentally predicted by the intention of the designer, thereby overcoming the various troubles of backward causation. In relation to natural beings, Kant claims that there is no question of presupposing a mental prediction of the purposes, unless we transcend our cognitive limits. Since this cannot be achieved, the ascription of purposes can only be a way for the subject to think of the object, but not something constitutive of the object itself.

Far from showing the ineffectiveness of a constitutive usage of the notion of purpose, this shows how Kant thinks of the purposiveness of natural beings by assuming model the kind of purposiveness which is typical of artefacts and technical products as the basic. Paradoxically he concludes that we cannot know the way of being of organized natural beings, which are irreducible to the way of being of artefacts, precisely because they are not artefacts.

Suppose, on the contrary, that natural purposiveness is not considered following the kind of purposiveness which belongs to artefacts: then that pattern of organization which involves a both descending and ascending causal series may be taken as typical of all those systems whose constitutive parts can provide some feedback to themselves and to the whole of which they are parts, in such a way that the relations among the parts within the system, and between the parts and the whole, facilitate talk of that system as both cause and effect of itself (McLaughlin 2001). In fact we can claim that organ A is self-produced when its activity is related backwards to its own subsistence, that is, when the specific activity of that organ is a condition of possibility of the subsistence of an organ B, whose

activity in turn is a condition of possibility for A. Thus A is not just a cause of B as it can subsist only via the action of B.

In addition, a formally identical causal structure can be found in artefacts: productive activity K is not simply the cause of purpose P, for K is itself activated by the presence of P. However, the machinery upon which such a structure is based differs substantially in the two cases. If, as noted above, the causal structure of artefacts is based upon the mental forecast of the goal—which brings it back to the simple structure of descending causality—then the machinery underlying organic structure is a mechanism comprising back-and-forth actions which make it irreducible to simple linear causation.

This feedback mechanism distinguishes the *being-for* of artefacts, which are always destined to be something different from themselves, and the *being-for* of organisms, which are self-contained: the organs that make them exist perform their function in such a way as their performance feeds back into their future performance in the same system (see Toepfer in this volume).

In this sense, if one can assume that what Kant calls external purposiveness is the structure capable of explaining the proper function of artefacts, since in this case it always depends on the intention of the agent or the user, then what Kant calls internal purposiveness can be seen as the structure capable of explaining the functionality of organs within an organism (therefore, the way of being of organisms, as distinct from the ontology of artefacts). However, internal purposiveness reveals this structure only when it is taken as radically distinct from external purposiveness, that is, as the *being-for* of a system whose organs act backwards on their own activity, thereby allowing other organs to subsist with the whole of which the organs are parts.

17. CONCLUSIONS

The above analysis exposes the difficulties and consequences faced by the assumption that the *being-for* underlying the way of being of artefacts is the same as the *being-for* of such natural beings as the organs of an organism. Specifically, the way of being of artefacts necessarily entails an external, autonomous subject giving sense to the artefact's being goal-directed; it cannot be conflated with the way of being of natural beings, since onto-

logically speaking the latter is constitutively different from any product having its organizational principle outside itself. In this sense, it is possible to say that there is a radical difference between the functions and purposes of an artefact and those of a living being (or of parts of a living being).

The proposed Kantian distinction between internal and external purposiveness allows us to determine this difference: external purposiveness can be taken as the structure accounting for the *being-for* of artefacts, and yet, internal purposiveness should be assumed to be the structure capable of explaining that organized natural systems (living beings) in which the relationship between the parts within the whole, and between the parts and the whole, is a circular inter-dependence in which all parts—in Kantian terms—are simultaneously means and goals with respect to the other parts and the whole.

Finally, it has been shown how the assumption of internal purposiveness as a structure accounting for the systematic organization of living beings requires us to move beyond Kant's transcendental framework. Kant's framework ties the notion of purpose to that of a designer's intention (which allows for a constitutive role of the notion of purpose with respect to the object to which the purpose is ascribed), and thereby reduces internal purposiveness to a mere metaphor (Wouters 2005). Although they are taken as radically different from artefacts, living beings are nevertheless considered *as if* they were artefacts or technical products. This makes the specific way of being of living beings (which is what makes them irreducible to artefacts) unintelligible.

The thesis that internal purposiveness has to be considered as a specific feature of living beings entails the assumption that it is impossible to think it on the ground of the model of purposiveness which is typical of artefacts and technical products. In other words, such an assumption implies the necessity of thinking a model of purposiveness without reference to intentions or something like intentions.

Although thinking of living beings as circular systems, with reciprocally inter-dependent parts and parts depending on the whole, requires the overcoming of the linear causal model underlying technical and productive procedures, it implies neither vitalism (which on the contrary can be considered as a reduction of internal to external purposiveness, so that there must be some principle originating the organization of living beings), nor assumed alternative causal models. The circular inter-dependence charac-

terizing such systems does not imply the impossibility of a linear reading of causal connections, only an expansion of the concept of cause: such connections should be considered within the unitary system as having different directions, depending on whether we want to explain a given process within the system, or the relationship between such a process and the totality of the processes constituting the system.

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