

Hegel's Organisational Account of Biological Functions

Edgar Maragat, University of Valencia

Abstract

Two concepts have polarised the philosophical debates on functions since the 1970s. One is Millikan's concept of 'proper function', meant to capture the aetiology of biological organs and artefacts. The other is Cummins' concept of 'dispositional function', designed to account for the real work that functional devices perform within a system. In this paper I locate Hegel's concept of biological function in the context of those debates. Admittedly, Hegel's concept is 'etiological', since in his account the existence of purposive organs is explained by appeal to their purpose, yet, against Millikan's concept, Hegel's does not presuppose the phenomenon of natural selection nor derives the function of tokens from the function of types. So, my aim is, first, to present Hegel's approach to biological functions as one neither purely etiological nor purely dispositional. It will appear rather as an example of an organisational account (as those advocated today by McLaughlin, Mossio and others), that attributes function according to present performances (unlike etiological accounts) and emphasises the role of functional parts in their self-production within the system they belong to (unlike dispositional accounts). Finally, I briefly discuss how Hegel's concept performs against common objections to organisational accounts.

Table of Contents

I. The Pull of Two Paradigms. II. The Singularity of the Teleological Concept. III. The Promise of Organisational Accounts. IV. Locating Hegel's Concept of Biological Function. V. Problems of Organisational Accounts. VI. Hegelian Rejoinders.

In the following I compare Hegel's concept of biological function to some other widely held philosophical views on functions. Sections I and II offer a presentation of two of them, the selectionist-etiological view and the dispositional view. Sections III and IV argue that Hegel adopts a different view, not any of those, actually a hybrid of sorts, namely, an *organisational* view (in contemporary terms). Sections V and VI shall present objections and Hegelian responses to this particular kind of approach.

I. The Pull of Two Paradigms

We often attribute functions to express the performance we expect of devices, behaviours, organisms and the like.¹ From our urinary system, for example, we expect (mainly) that it will regulate the composition, volume, pressure and pH of the blood by excreting urine. Hence, we say that it has that function, a function that it will probably perform successfully throughout its lifespan. As a consequence, when extraordinary circumstances, such as an infection, prevent the system from fulfilling it, its function does not vary accordingly. And if a degeneration of some type or a congenital malformation or a tumour or a chronic ailment prevents it from filtering, etc., we also say that the device does not work well, that it does not work properly, that it does not fulfil the function that it anyway has.

Other times we attribute functions in recognition of the effective contribution of a device to the production of an effect within the system to which it belongs. Of the pieces of thick cardboard or wooden wedges we do not say that they have the function of remedying the instability of tables, but when we insert them under too short legs, they mitigate it many times, and, once they are placed in the convenient way, we attribute the function of effecting this benefit to them.

Attributions of the first type suppose that the functional device exists or is present, because it produces a certain effect. We assume that it is *because* urinary devices filter the blood and eliminate waste that many animals possess them. More specifically, it is usually supposed to be because urinary devices from our ancestors filtered blood and eliminated waste that human beings now alive, almost without exception, have them. Attributions of the second type, on the other hand, are based on an analysis of the present benefit that the ordinary behaviour of the device has in the system—or one of the systems—to which it belongs. The analysis does not consider how the device has become part of it. It simply studies what causal relations the device currently maintains with other devices within the system and whether those relations make some joint effect possible.

Thus, attributions of the first type are commonly based on an appeal to the lineage of the devices. If an organ, for example, exists or is present in an organism because in the past organs of its kind contributed to the prosperity of organisms with that organ, of which it is a descendant, then the function of the organ is to contribute to that prosperity in the way their functional ancestors did. Therefore, from this perspective, the history and, specifically, the functional past of the class to which the device belongs determines its function. Adopting this approach, philosophers like Ruth G. Millikan and Karen Neander think that objective functions are determined by that history. They subscribe, therefore, to an etiological account of functions.

Their account is more precisely labeled 'selectionist', because the relevant prosperity is interpreted in this case as a relative advantage that causes a selection (natural or otherwise).²

In contrast, attributions of the second type are based on the current causal role of the devices. For them, it is irrelevant whether the devices are descendants of identical or similar devices. It is also irrelevant what causal roles these ancestors could have played in the past, if any. Only present capacities and present contributions of the device within the containing system are important for those attributions. Adopting this approach, philosophers like Robert Cummins think that objective functions are determined by the present disposition to the production of joint effects. Thus, Cummins—as well as his many followers—defends a dispositional or systemic account of functions.

Since the 1980s (or late 1970s), philosophical debates on functions have been polarised around these two approaches.³ Although it can be argued that these accounts do not exhaust the theoretical options, and, in fact, an alternative view will be discussed in the following, it is easy to understand why the sympathies of the participants have been largely divided between them. Functions seem conceptually related to the end of things and ends are understood, as Aristotle observed, in two fundamental senses: as aims or as results (*DA* 415b2, see McLaughlin 2001, 20). The etiological account interprets functions in the first sense. The dispositional account in the second.

The etiological account faces at least two problems, well noted in the literature. One is that it cannot recognise functions in novel devices. Devices without ancestors of their kind cannot be said, it seems, to have a function. A second problem is that it insists on attributing functions to devices that have completely lost the capacity, or have never had it, to produce beneficial effects of some kind. A completely atrophied kidney is said to have the function of filtering blood, even if it has not done so for a long time, even if it has never been able to do so, simply because there is a more or less recognisable causal connection between the existence of functional kidneys in the past and the existence of the completely atrophied kidney—or does it just look like a kidney or is it only in the place where there usually is a kidney?

The dispositional account faces a different fundamental problem: it does not seem able to distinguish the allegedly characteristic functions of devices of some type from any other kind of contribution to joint effects that they may do. For this standpoint, all the causal contributions to a joint effect of a device have the same right to be considered their functions. Hence, the function of the ears is both to detect sounds and to hold earrings (among others). Everything that the ears do, with respect to the organism to which they belong, is allegedly their function.

However, both the etiological and the dispositional accounts have much in their favour. The etiological account distinguishes what the dispositional account cannot differentiate. If the services provided in hearing sounds by preceding ears, but not those provided by holding earrings, serve to explain the current existence of a certain ear, then its function is to help in hearing, not to hold ornaments. In return, the dispositional account permits the recognition of functions performed by novel devices, because it pays what seems to be due attention to the causal potential they have in the systems that contain them. It is as if the shortcomings of one conception were the strengths of the other.

II. The Singularity of the Teleological Concept

In this section I will make explicit that only the etiological account supports a teleological concept of function. Hegel's concept of function will appear later on as a strict teleological one. However, 'function' means sometimes teleology and sometimes not, as a matter of fact. According to Millikan, for example, the dispositional 'functions' of which Cummins speaks have nothing to do with purposes (Millikan 2002, 119). Cummins himself agrees (2002, 157–61). On the contrary, 'proper functions' in Millikan's work refer exclusively to functions that imply purposes, which she considers paradigmatic cases. This suggests that the word 'function' is equivocal.

In my opinion, we should admit uses of 'function' that do not imply purposes but are also paradigmatic, at least from a lexicographic point of view. We speak of the 'function' that a rock serves in the bed of a river, preventing a mass of sediments from advancing, in a sense that, of course, does not imply any purpose or teleology. We could paraphrase that attribution, without loss of meaning, by saying that if the rock were not there, the sediments would be washed away by the stream of water, and that the consequences that their accumulation in that place had (e.g. that some birds have been able to nest on them) would stop occurring or would never have occurred. In this context, a function is nothing more than an effect produced causally by an object or whose production an object causally contributes to, considered from the perspective of some external benefit.

By contrast, the attribution of a teleological concept of function cannot be paraphrased in such a way. Both Millikan and Neander claim that when we attribute functions that imply purposes, we do not indicate what comes from what (see e.g. Millikan 1989a, 293–4; cf. Neander 1991, 458–9). We indicate rather reasonable expectations of performance of a device, that the device can fail to serve. Furthermore, in this case we additionally point to some explanations that can be given of the existence and shape of a device, explanations that refer to those expected performances.⁴

Thus, the teleological concept of these authors is of the etiological kind. Their approach is called 'etiological' because it contains an explanation of the causal origin of functions: as I said, *because* a certain device is supposed to do this or that, that is, has a certain function, it exists and is as it is.⁵ Their account is also 'selectionist'—functions are selected effects—because what justifies such an explanation is the causal connection between the fact that devices like that one in the past did what this now is supposed to do and the current existence of devices of its kind (including itself). The actual function is meant to have been 'selected' in the past.

Both Millikan and Neander argue that the teleological-selectionist-etiological view they support is essential to justify a scientifically respectable, important and well differentiated, even paradigmatic, use of the term 'function', a use allegedly common in evolutionary biology and other biological sciences (see Millikan 2002, 116–7 and Neander 1991, *passim*). Evolutionary biologists (and others) arguably attribute functions in this teleological sense to traits, organs and patterns of behaviour.

This only makes it all the more urgent to redeem the deficiencies of the etiological account. In view of the problems to which I referred earlier, adherents of this account may certainly 'bite the bullet' of the objections and admit that novel devices, formed spontaneously, have no functions at all and that, on the other hand, for example, atrophied kidneys, suddenly deformed, have the same functions as kidneys at full capacity. It may be thought that novel devices have effects, including beneficial effects, but not functions, whereas the devices selected to perform a function have it, properly speaking, by virtue of that selection.⁶

Yet, as an alternative to these concessions, several philosophers have recently tried to develop a new, teleological account of functions that retains the teleological dimension of the selectionist view and, nonetheless, escapes the odd consequences faced by Millikan and Neander. The correction is meant to recognise the role that actual performances and capacities of devices deserve in the determination of functions. Perhaps a correction in this sense will not unify etiological and dispositional accounts, since it will not eliminate the purely non-teleological use of 'function', but it will help us to resist the temptation to oscillate between them, due to their relative advantages.

III. The Promise of Organisational Accounts

I will now introduce a synthetic account of functions with these traits, which I will call 'organisational'.⁷ Later, in section IV, I will argue that Hegel's concept of biological function is of this very kind.

Organisational accounts of functions—such as those of Peter McLaughlin, Matteo Mossio and others today—are typically accounts of biological functions, built upon a certain concept of organism or organised system.⁸ They attribute biological functions to the organs (or members, parts) of organisms. Organs are considered, actually, the main non-derivative function bearers. Inasmuch the ordinary performance of organs allows the organism to which they belong to stay alive, organs are said to have a function. Their function is, precisely, to contribute in a particular way to the self-maintenance of that (living) system.

Organisms are conceived, from this stance, as complex systems, with differentiated parts, that keep themselves existing within an environment. Some proponents have argued that the system to which the functional organ belongs must (1) instantiate closure, (2) have parts playing different causal roles within the system, and (3) actively preserve itself (Mossio et al. 2009, 824–8; cf. Artiga 2011, 111–2).⁹ McLaughlin stresses, above anything else, the ‘self-reproductive’ character of natural entities whose parts have functions. For him, closure and internal articulation are, respectively, effect and requirement of the self-reproduction that characterises the activity of organisms.

The peculiarity of organisational accounts is that such a self-(re)production is understood not as reproduction of an individual in other individuals, that is, as the production of offspring of one single kind, but rather as a self-productive process within the organism itself:

Only a mechanismlike regeneration (self-repair), through which an organism replaces and repairs its own parts, that is, has a causal influence on the existence and properties of the parts that make it up, can explain why the benefits conferred on an organism by one of its traits (tokens) can be causally responsible for the existence and properties of that trait (token). (McLaughlin 2001, 208)

Accordingly, it is not the causal contribution in the past of precursors of an organ to the actual existence of the organ what confers it now a function in the teleological sense. It is rather its present contribution to its own existence—in collaboration with other organs—what endows it now with its functional character.

Contemporary organisational accounts of biological functions were born to combine the differential benefits of etiological and dispositional approaches. It can be argued that they are species of the etiological genus, because they try to explain why functional organs are where they are, alive and functioning, but they can also be understood as dispositional, since they link such an explanation to the present performance of the organs. They seem, thus, true hybrids of the two paradigms above described.¹⁰

How do such accounts perform in the face of the problems of etiological and dispositional views on functions? As I said, the main problem of etiological accounts is that they lead to attribute functions to organs that lack the capacity to perform the work that is said to be their function to perform. Organisational accounts circumvent this problem by making the attribution of the effective and present contribution of the organ dependent on the maintenance of the active containing system. Certainly, organisational accounts, like common etiological accounts, refuse to attribute functions to organs of new appearance, even if they are physiologically capable of serving as efficient parts of an organism. But in the case of organisational accounts this happens only temporarily. When the new functional organ starts to make a systemic contribution to the self-maintenance of the organism, the organisational account claims that it acquires the function—or one function—that it is capable of performing in it. As soon as a pure capacity begins to be an exercised capacity, we are allowed to attribute a function that is possessed and exhibited (McLaughlin 2001, 168).

Proponents of organisational accounts also claim to avoid the issues that affect dispositional accounts of functions. The main problem, again, is that dispositional accounts are not able to distinguish in a principled way the essential functions of a device from other effects that it might have. The organisational account finds in its definite idea of organism—to sum up, a relatively closed, internally complex and self-reproducing system—a criterion to separate proper functions from other performances and capacities. The organ has the function, as I said, of helping the organism to stay alive, active, self-productive, by contributing to a global process of self-maintenance. Of course, it would have other effects if, being as it is, it were related in other ways to other organs, let alone if it were not as it is. But if those changes make it useless or in fact inimical to the self-maintenance of the organism, organisational accounts claim that they deprive it of its apparent function. In this case it is not abstract dispositions that determine functions, but actual arrangements and actual contributions to the self-production of the reference system.

For all these reasons, current organisational accounts seem, indeed, to unite the benefits of their various precursors. They capture, to begin with, as etiological accounts do, the teleological character that seems assumed, quite obviously and unproblematically, in many attributions of functions. They are also able to distinguish what a device is doing right now from what it is supposed to be doing (for some participants in the debate this trait is critical to capture the normative force that attributions of teleological functions have). But, unlike common etiological accounts, they do not separate the attribution of functionality from the analysis of current dispositions and outputs. And yet, unlike dispositional accounts, they seem in a position to properly differentiate essential dispositions and performances from inessential adventitious

dispositions and performances, that are irrelevant to the understanding of the form, existence and activity of the device or organ.

Prima facie, thus, organisational accounts seem to combine or synthesise the virtues of other views. They seem to be the unified and fully satisfactory conception of functions that some have been looking for during the last decades. A conception of this kind does not seem to sacrifice any of the aspects of the subject that, according to my presentation in sections I and II, we want to see recognised, understood and connected.

IV. Locating Hegel's Concept of Biological Function

But organisational accounts are not true hybrids of other recent conceptions, do not descend from them, as Mossio and others assume, since in fact they have a longer philosophical history than any others, as McLaughlin (2001) has shown. They go back to the concepts of life, nature and purpose of Aristotle, and are obviously related to the concept of organism or organised entity of the naturalist Buffon (George-Louis Leclerc) and Kant, being more than two centuries old. I will now argue that also Hegel advocated an organisational account of biological functions in his *Logic* and his *Philosophy of Nature*.

Let me provide some background. Aristotle speaks of the nature of living beings as being both their form (or configuration) and their end or purpose, since everything that a living being does serves its own life, that is, serves its own existence and the maintenance of its form. This is reflected in its internal organisation. Its parts—members or organs—also have their end in the life of the whole. But each one serves that purpose in a particular way. In his books on physics, Aristotle gives as an example the purpose of different types of teeth (*Phys.* 198b24–6). In carnivores, the incisors are used to tear and bite and the molars to chew. In the form they have, we recognise, he thinks, their various particular purposes. When they are used for tearing and chewing, they contribute to the preservation of the life of the organism to which they belong.

However, Kant treats those benefits as apparent purposes. He thinks that the way in which the different organs are shaped and arranged makes it necessary to have an idea of the whole to explain why each of them is as it is. Thus, he judges that there is an analogy—even if a loose one—between the organs of organised beings and the parts of an artefact (see Kant 1790, § 65). And, as a consequence, he assumes that it is for us irresistible to speak of organs as if they were the intentional product of an artist. But he also grants that to speak of nature as if it had intentions is epistemologically illegitimate. To that end, he believes that we should have a knowledge that we cannot have, by our own means, of the origin and *raison d'être* of nature as it is (see Kant 1790, § 75).

Nonetheless, as Hegel overtly recognises, Kant indeed reanimates the Aristotelian concept of life, for he conceives the organised being as an end in itself, that is, as a 'natural end' (Kant 1790, § 64). The end of the organism is its own life. This is a concept that Kant has illuminated in several ways. Firstly, in a way that he actually considers somewhat 'inappropriate', by saying that an organism is *cause and effect of itself* (see §§ 64, 65). Secondly, by means of an example, the example of the tree, which in three particular senses is cause (and effect) of itself: the tree is cause of itself because it generates trees like it, it is cause of itself because it 'grows' (including here all that it does to regenerate itself when it gets damaged or loses some of its parts), and is cause of itself because each of its parts is produced by others (for the leaves live thanks to the roots and vice versa, and so on) (see § 64). Thirdly, by means of an analysis of the requirements imposed by the concept: (1) the natural end should not be possible as the pure effect of natural mechanical laws (*ibid.*); (2) the concept of the specific organism must be the ground for the cognition of its parts (see § 65); and (3) the parts of the organised entity must produce naturally and reciprocally each other (*ibid.*).¹¹

Yet, he reanimates at most the mere concept, because, as I said, natural teleology might only be apparent for him.¹² Kant thinks, actually, that if a non-intentionally governed mechanism has generated the so-called organisms, then it is not appropriate to say that trees and the like are (natural) ends. And, if the life of the plant or the animal is not its very own purpose, then its parts have no purpose at all, because they do not serve something that has an end in itself, or, at least, it is not clear that they have an end and serve a purpose. Thus, we can only speculate with the possibility that nature has a purpose *outside* of itself, and living things serve *that* external end.

Hegel, however, intends to reanimate Aristotle's thought completely and attribute purposiveness to what arises by nature (see *Enc.* §§ 204R, 360R, *VAMN* 8: 74–6).¹³ He thinks that once it is well understood what it is to serve one's own production, that is, to be the cause of oneself, the concept of a real (objective) end is vindicated. The concept is vindicated, precisely and exclusively, as the concept of an objective process of self-production (see *GW* 12: 171): in a process of this sort, something exists and does what it does because it exists and does what it does.

Hegel applies this concept of 'inner purpose' to the understanding of vegetal and animal life (see *Enc.* §§ 251, 337, 342, 352, 360, 365, although, for reasons that cannot be examined here, with doubts to vegetal life and without doubts to animal life). The parts of plants and animals have purposes by virtue of their self-production within the organism. Self-production manifests itself according to Hegel in two fundamental processes, both constitutive of organic individual life: on the one hand, in (1) the internal articulation of the organism as a whole of members-

organs that produce each other reciprocally (see *Enc.* § 356), and, then, in the process that Hegel calls 'vital' of (2) assimilation of food, metabolism, growth, and self-repair (see *Enc.* § 365). Consequently, Hegel interprets functions (*Funktionen*) as purposes or references to a purpose of the members (differentiated parts) of organisms determined fundamentally by intraorganic processes (cf. Spahn 2007, 179, 238, 241, and Höhle 1987, 313 ff.).

By contrast, the self-production of the organism (and therefore functionality in the organism) is not manifest, Hegel thinks, in the processes of generation of offspring, which he considers particularly exposed to contingencies (see *Enc.* §§ 368–70). In them Hegel thinks that a *lack of correspondence* between the individual and its genus, between the objectivity of the living being and the concept (form, end) of an encompassing kind, is revealed (§§ 369, 371, 374, 375). It follows that, in his eyes, the attribution of purposes and functions cannot be based on an implicit appeal to the reproduction of the species in similar, but new, distinct organisms, as selectionist-etiological conceptions argue. Like Aristotle, Hegel thinks that nature, insofar as it is oriented to an end, resembles more than anything else a doctor who heals herself (*Phys.* 199b31; see *VANM* 8: 77). What heals herself or itself, in one of several possible senses, is what has an end and is a realised end. And what serves in that 'healing' has an end that we call its function.

In this sense, Hegel's concept of organic function is a genuine organisational concept, and not the usual etiological concept. Like supporters of etiological concepts, Hegel affirms certain specific functions, which are such and such because they have the particular effect they have, but unlike Millikan functions, Hegel's proper functions are not determined by the past reproduction of similar organisms. They do not result, thus, from the fact that the class of each organ produced in the past, as an effect, the proliferation of itself.¹⁴ For Hegel, as for contemporary defenders of organisational accounts, function is determined by participation in a current process, characteristic of natural organisms (for him, animals most definitely), of self-maintenance or self-production.¹⁵ Therefore, like dispositional accounts, Hegel's attributes (biological) functions according to actual dispositions and performances. But in his account, as I have argued, those performances are conceived as truly teleological processes.

Hegel is, therefore, in agreement with those who think that it is at the level of the biology of (living) organisms that functional analysis should be practised. Yet, unlike advocates of functional analysis based on current capabilities like Cummins, Hegel thinks that functional analysis in biology should focus exclusively on feedback mechanisms of strict self-production or, as he sometimes says, of self-preservation.

V. Problems of Organisational Accounts

The main problem with organisational accounts like Hegel's is that they seem based on a very idealised view of organisms. Are functional organs causes of themselves *because* they cause their own causes? If that were true, we could infer that an organ that ceased to fulfil the function it was supposed to have would cease to exist or be as it is. But it is doubtful that this will happen, at least very often. An ear that stops being able to track sounds obviously does not cease to exist. Moreover, it is likely that the rest of the organism to which it belongs will 'preserve' it in its new dysfunctional shape. The organisational account seems to imply that if an organ is preserved in the system of which it is a part, it is because of the function it performs, since it affirms that an organ exists as it is (in an organism) because of the function it has. Therefore, since *ex hypothesi* the dysfunctional ear does not hear (or does not help in hearing), but is preserved, even actively maintained in its existence, the account seems to imply that its function is not to hear, even that it never was (cf. Artiga 2009, 116).

After this reflection it seems that, for this approach, strictly speaking, only vital organs, without whose presence and contribution the maintenance of the living organism is by definition impossible, have functions. Of course, it is quite obvious that a heart that stops functioning ruins the life of the organism. But since the heart cannot function without a respiratory system, we can say that the heart keeps the respiratory system alive, while this reciprocally keeps the heart alive. The heart *causes* the existence of the respiratory system and the respiratory system *causes* the existence of the heart. Thus, of the function of lungs taking in oxygen, as of the heart pumping blood, the organisational approach seems able to give a reasonable account, but not quite of the function of, for instance, teeth, patella or ears, being non-vital parts of organisms.

This first objection can be rephrased in the following manner: many apparently functional devices do not exist (nor are they as they are) because they serve a function, as a matter of fact. Therefore, it is not true that functions are effects of their own fulfilment or, in Hegelian terms, that what has an end (and function in a teleological sense) is a realised end. This fact attacks the root of the Aristotelian-Hegelian concepts of teleology, life and organism, whose notional core, as argued, is the idea of an objective process of self-production. Consequently, it apparently suspends the promises of organisational accounts, based on these concepts.

Another objection that is raised against organisational accounts is that they are of no use when it comes to explaining the function of organic products and behaviours whose output is the generation of offspring and, in general, the promotion of the life of other congeners (see Delancey 2006, 88; Artiga & Martínez 2016, 105 ff.). Sperm, for example, has no apparent function inside the organism that produces it, it does not contribute to the maintenance of the life of that organism, it does not contribute to the production of any of its parts. Therefore, the organisational approach seems to imply that sperm has no function at all. However, it certainly

seems that it has a very specific function within the life of a species. Organisational conceptions appear inept to account for functions such as the one we attribute to sperm, i.e. functions that transcend the life of individual organisms.

These first two objections are complementary. Organisational accounts appear, by virtue of both, as failed etiological perspectives. They seem to neglect the way in which an adequate understanding of the reproduction of species can secure an application of the idea of self-production with etiological-teleological implications. In return, they propose an application at one level, the organism as a closed system, in which it does not generally have it. Let's say, the etiological-selectionist approach covers many more attributions, which seem reasonable, of functionality, while the etiological-organisational account can only justify a few attributions, exclusively to strictly vital organs.

To these two objections, others that etiological accounts commonly face may be added. In particular, supporters of the dispositional (non-etiological) approach like Wouters applaud the fact that the debate on the attribution of function takes as its essential target the capacities and performances of organic devices within organisms, but do not accept that all functions must be determined by reference to the contribution in that context to self-maintenance. Wouters thinks that a richer definition of the life of the organism, not referred exclusively to its capacity to self-maintain, but also, for example, to its stability (chemical or thermodynamic) or to the internal organisation itself, could serve to determine functions independent of regeneration processes (Wouters 2006, 57). Such a broader definition might help dispositional accounts to solve their problems without forcing them to become organisational accounts, themselves confronted with difficulties (those indicated above, to begin with). Wouters objects that organisational accounts have to pay unnecessarily high 'metaphysical' prices to solve the problems of dispositional accounts (*ibid.*). The high 'metaphysical' price is mainly a sophisticated conception of the causal explanation of the existence of functional devices, which McLaughlin calls holistic (since, supposedly, it makes an organic entity or whole responsible for the explanation of its parts).¹⁶ Wouters believes that the price is too high mainly because it only, or at most, justifies attributions of functions with teleological meaning. What about 'function talk' in other fields? Do not neutrons have the function of holding the nucleus of atoms together?

VI. Hegelian Rejoinders

Does Hegel have much to say against these objections in defence of his concepts of teleology, life and organism and, likewise, of his idea of biological function? Actually, I think so. I will end pointing out some rejoinders available to Hegel to common objections against organisational accounts of biological functions.

The first thing that should be said or clarified, in a preliminary fashion, is that those three concepts (teleology, life, organism) are logical concepts for Hegel, that is, abstract concepts, possibly valid for both natural organisms and other types of systems. Thus, in his logical work, in which they are introduced and discussed, Hegel does not intend to demonstrate that some natural living beings are ends in (and for) themselves and that their organs have proper functions, let alone to decide, for instance, whether kidneys (or other comparable organic devices) are functional organs or only urinary systems (or other comparable systems) are, but not their parts. He only aims to offer an adequate analysis of what it is to have an end, what is required of something to have an end or purpose (and 'function' and functional parts in a teleological sense, accordingly), and to argue for the legitimacy (or 'truth', as he puts it) of some teleological explanations. His analysis of the concept of end turns out to be, specifically, etiological, in the sense that it attributes purpose to what is the cause of itself. But it does not prejudge whether there are many or few such processes in nature, or anywhere else. As a consequence, Hegel's analysis is not immediately affected by the problems that the specific application of the concept of function faces on many levels, scientific or otherwise, and its abstract validity can arguably be vindicated.

Furthermore, from his logical, non 'theoretical', organisational and etiological non-selectionist standpoint, Hegel could react to the objections made in the previous section, more specifically, in the following way. With regard to the first objection, Hegel appears not committed beforehand to any common attribution of function. For him, only devices that are currently causes of themselves have functions. An ear that does not contribute to the persistence of an organism is like the hand severed from the body in Aristotle's old example. According to Aristotle, the severed (or dead) hand looks like a hand, but it is not a hand (see *PA* 640b30–641a6). Likewise, the ear that does not serve to hear seems an ear, but it is not. To the extent that the ear becomes an inert appendage, it ceases to have function, it ceases to be an ear, it ceases to be an organ, that is, a member of an organism. It becomes an 'unimportant externality' (as according to Hegel, for example, a man's beard, *GW* 8: 174). Our habit of attributing to particular things like dysfunctional ears particular functions does not endow them with a function at all. And, in Hegel's view, neither does the fact that a dysfunctional ear sometimes results from the transformation (say, degeneration) of a functional ear.

With regard to the second objection, I will say the following. As pointed out, Hegel expresses a sharp scepticism in several places about the ideal character of the process of generating offspring. He thinks that it is a process particularly exposed to hazards and accidents, in which most evidently the 'impotence' or inability of nature to hold to the different forms that it adopts comes to the fore. In this evaluation some readers see a pronounced sensibility of Hegel towards the drift of organic forms and the lack of purpose in the vegetal and animal kingdom

that could well be associated to the non-teleological perspective on the evolution of species that Darwin later introduced (Wolff 1992, 134). Others will see, however, an exaggeration or, more precisely, the confusion of what is exceptional, that the offspring exhibit unprecedented features, with what is preponderant, that the offspring exhibit traits of their proximate ancestors.

Admittedly, Hegel could hardly have an accurate view of the contingencies that affect the processes of generation of offspring (not even Darwin could!) and, if he had had, his views on teleology and functionality in nature would surely have been qualified. Yet, given the organisational point of view that he adopts and taking for granted the general contingency of reproduction, i.e. production of one's own form, in others, I think that Hegel would be perfectly willing not to consider organic products such as sperm to be functional. Hegel could accept this striking consequence of his conception. In my opinion, he would not take it as an objection demanding an answer or as a problem to solve.

Otherwise, Hegel would not treat the lack of function of sperm like the lack of function of the 'deaf ear'. Consider that a functional ear does not have an independent function of its own either, because alone by itself it does not cause or maintain other members of the organism alive. The ear only has a function insofar as it pertains to what Hegel calls the 'system of sensibility' (*Enc.* § 354), no doubt vital in itself.¹⁷ On the other hand, sperm (or semen) does not have it, in Hegel's eyes, for this reason: because it is not the cause and effect of itself neither by itself nor as a part of a comprehensive system. The latter marks a point at which Hegel separates from Aristotle and his commitment to the fixity of forms. The 'inability [*Ohnmacht*] of Nature to hold fast to the realisation of the Notion [*den Begriff in seiner Ausführung festzuhalten*]' (*Enc.* § 250R) makes sperm *the cause of something else*, of a new configuration of life, not the cause of itself and, thus, not an objective end.

On the other hand, gregarious behaviours and even behaviours of symbiosis (of one kind or another), which contribute to the health and preservation of many individuals other than the one who exhibits the behaviour, that is, that transcend the life of individual organisms, could be considered by Hegel functional from the superorganic perspective afforded by the intraspecific collective or the living whole that symbionts form. He would be able to do so, even if he did not actually consider this possibility in his works, as far as I know. In general, the organisational account seems well equipped to treat living individuals as functional organs of a supraindividual organism (cf. Mossio et al. 2009, 835).

Finally, turning to Wouters' objection, raised against McLaughlin's organisational view, I think that Hegel would respond with the orthodoxy of etiological conceptions, represented by Millikan, Neander and McLaughlin himself, which is part of the conceptual core of organisational accounts. Only the reference to the contribution to self-maintenance (for some of the species,

for others—as for Hegel—of the living individual) has teleological significance. So, if functions are teleologically understood, as Hegel undoubtedly encourages, only contributions to self-maintenance can determine functions. Other contributions to joint effects, whether beneficial or not, and whether to the organism itself, to its congeners or to the species (or ‘genus’), must not entail the attribution of proper functions or purposes. Beyond the field of the living self-producing entities, so Hegel claims, ‘function talk’ is derivative or metaphorical.¹⁸

References

- Aristotle (1961), *Parts of Animals. Movement of Animals. Progression of Animals*, trans. A. L. Peck & E. S. Forster. Cambridge, Mass./London: Harvard University Press/William Heinemann.
- Aristotle (1970), *Physics: Books 1 & 2*, trans. W. Charlton. Oxford: Oxford University Press.
- Aristotle (1993), *De Anima: Books 2 and 3*, trans. D. W. Hamlyn. Oxford: Clarendon Press.
- Artiga, M. (2011), ‘Re-Organizing Organizational Accounts of Function’, *Applied Ontology*, 6 (2), 105–24.
- Artiga, M. & Martínez, M. (2016), ‘The Organizational Account of Function is an Etiological Account of Function’, *Acta Biotheoretica*, 64 (2), 105–17.
- Cummins, R. (2002), ‘Neo-Teleology’, in A. Ariew, R. Cummins & M. Perlman (eds.), *Functions: New Essays in the Philosophy of Psychology and Biology*. Oxford: Oxford University Press, 157–72.
- Cummins, R. & Roth, M. (2009), ‘Traits Have Not Evolved to Function the Way They Do Because of a Past Advantage’, in F. Ayala & R. Arp (eds.), *Contemporary Debates in Philosophy of Biology*. London: Wiley-Blackwell, 72–85.
- Delancey, C. S. (2006), ‘Ontology and Teleofunctions: A Defence and Revision of the Systematic Account of Teleological Explanation’, *Synthese*, 150, 89–98.
- Gambarotto, A. (2018), *Vital Forces, Teleology and Organization: Philosophy of Nature and the Rise of Biology in Germany*. Berlin: Springer Verlag.
- Godfrey-Smith, P. (1993), ‘Functions: Consensus Without Unity’, *Pacific Philosophical Quarterly*, 74, 196–208.
- Hegel, G. W. F. (1812–6), *The Science of Logic*, trans. G. di Giovanni. Cambridge: Cambridge University Press, 2010 (I refer to the pagination of *GW*, vols. 11, 12, and 21).
- Hegel, G. W. F. (1968 ff.), *Gesammelte Werke*, ed. Nordrhein-Westfälischen Akademie der Wissenschaften. Hamburg: Meiner (abbreviation used: *GW*, indicating volume and page number).
- Hegel, G. W. F. (1983 ff.), *Vorlesungen: Ausgewählte Nachschriften und Manuskripte*. Hamburg: Meiner (abbreviation used: *VANM*, indicating volume and page number).

- Hösle, V. (1987), *Hegels System: Der Idealismus der Subjektivität und das Problem der Intersubjektivität*. Hamburg: Meiner.
- Kant, I. (1790), *Critique of Judgement*, trans. W. S. Pluhar. Indianapolis/Cambridge: Hackett, 1987.
- Kreines, J. (2015), *Reason in the World: Hegel's Metaphysics and its Philosophical Appeal*. Oxford: Oxford University Press.
- McLaughlin, P. (2001), *What Functions Explain: Functional Explanation and Self-Reproducing Systems*. Cambridge: Cambridge University Press.
- Michelini, F. (2008), 'Thinking Life: Hegel's Conceptualization of Living Being as an Autopoietic Theory of Organized Systems', in L. Illetterati & F. Michelini (eds.), *Purposiveness: Teleology between Nature and Mind*. Frankfurt: Ontos Verlag, 75–96.
- Millikan, R. G. (1989a), 'In Defence of Proper Functions', *Philosophy of Science*, 56 (2), 288–302.
- Millikan, R. G. (1989b), 'An Ambiguity in the Notion "Function"', *Biology and Philosophy*, 4, 172–6.
- Millikan, R. G. (2002), 'Biofunctions: Two Paradigms', in A. Ariew, R. Cummins & M. Perlman (eds.), *Functions: New Essays in the Philosophy of Psychology and Biology*. Oxford: Oxford University Press, 113–43.
- Mossio, M., Saborido, C. & Moreno, A. (2009), 'An Organizational Account of Biological Functions', *British Journal of the Philosophy of Science*, 60 (4), 814–41.
- Neander, K. (1991), 'The Teleological Notion of "Function"', *Australasian Journal of Philosophy*, 69 (4), 454–468.
- Petry, M. J. (ed.) (1970), *Hegel's Philosophy of Nature*, 3 vols. London/New York: George Allen & Unwin/Humanities Press (abbreviation used: *Enc.*).
- Saborido, C., Mossio, M. & Moreno A. (2011), 'Biological Organization and Cross-Generation Functions', *British Journal for the Philosophy of Science*, 62, 583–606.
- Spahn, Ch. (2007), *Lebendiger Begriff — Begriffenes Leben: Zur Grundlegung der Philosophie des Organischen bei G. W. F. Hegel*. Würzburg: Königshausen & Neumann.
- Toepfer, G. (2004), *Zweckbegriff und Organismus: Über die teleologische Beurteilung biologischer Systeme*. Würzburg: Königshausen & Neumann.
- Wolff, M. (1992), *Das Körper-Seele-Problem. Kommentar zu Hegel, Enzyklopädie (1830)*, § 389. Frankfurt am Main: Vittorio Klostermann.
- Wouters, A. (2005), 'The Function Debate in Philosophy', *Acta Biotheoretica*, 53, 123–51.
- Wouters, A. (2006), 'Review of: Peter McLaughlin, *What Functions Explain*', *Acta Biotheoretica*, 54, 55–9.
- Wright, L. (1973), 'Functions', *Philosophical Review*, 82, 139–68.

¹ It is undoubtedly very common to attribute functions to traits and behaviours (or actions), when talking about biological functions. Accordingly, the literature speaks, for example, of how myopic an eye is and what function that trait has, as well as of the function of expressions of submission, calls, predatory strategies, etc. However, it might be said that it is the eyes of a certain type or with a certain form, that is, with certain features or traits, or the neuromotor mechanisms of particular characteristics that are responsible for some behaviour which have one function or another. Therefore, for reasons of legibility, as the paradigmatic bearer of functions I will speak of 'devices', except when precisions are required. The reader should keep in mind that those bearers (i.e. devices) can be parts of organisms, organic apparatuses or systems, parts of artefacts, entire artefacts or entire organisms, and that, by extension, we attribute functions to their traits and behaviours. However, I do not intend to answer at this point some ontological question about the true basic bearer of functions, nor to settle a corresponding linguistic issue. For a similar terminological decision, that privileges 'structures' over any other function bearer (like traits or events), see Delancey 2006, 71.

² Etiological accounts are not necessarily selectionist, of course, e.g. Larry Wright's (see Wright 1973), yet the importance of selectionist accounts in the Philosophy of Biology is widely recognised (see Cummins & Roth 2009, *passim*). As a matter of fact, Millikan argues that Wright's account is not properly etiological because it is not overtly selectionist, that is, a selected-effects theory (see Millikan 1989b, 172; cf. Neander 1991, 459). In his review of the philosophical debate, Wouters attributes the 'etiological' (also called 'historical') view to, first, Millikan and Neander (Wouters 2005, 125).

³ An extremely helpful account of those debates can be found in McLaughlin 2001, 65–141. In contemporary philosophical literature, there is a tendency to confront etiological and dispositional accounts as if they were rivals, that is, incompatible understandings of one single phenomenon (see e.g. Cummins 2002). Yet, there have also been voices advocating a reconciliation or combination of the perspectives that endorse them (e.g. Godfrey-Smith 1993).

⁴ For the record, Neander even argued, contrary to Millikan, that the only paradigmatic sense of the term 'a function' has those implications (see Neander 1991, 458–9).

⁵ The modern-classical account of the relation between that 'because' and the attribution of functions is Wright 1973. Cf. Godfrey-Smith 1993.

⁶ To circumvent the problem, Neander introduced the distinction between having a function and serving a function (1991, 465). A novel device, according to her, may well *serve* a function, even if it cannot *have* a function. As far as I know, this manoeuvre has not minimally satisfied the critics of etiological accounts.

⁷ I take the name 'organisational account' from Mossio et al. 2009. We could also talk about 'organismal' accounts (see Wouters 2006, 57). On the other hand, it would be better to say that organisational accounts have been recently 'reborn' (or reinvented), rather than 'born', for reasons that I will lay out in section IV.

⁸ Otherwise, biological functions could be seen just as a paradigm, assuming that non-biological self-maintaining systems exist or could exist (see Saborido et al. 2011, 592–3). For an overview of different organisational accounts, see Saborido et al. 2011.

⁹ At first glance, organisational accounts are ill-equipped to explain what justifies assigning functions to artefacts or specific mechanisms that are part of artefacts. This may seem a comparative limitation and invalidate them as general accounts of functions. But, otherwise, we may think, in the spirit of Millikan, that genuine or proper functions are non-derivatively functions of organs and only derivatively genuine functions of artefacts. It could be that artefacts have their own functions, yet derived functions, only and to the extent that their designers and users have purposes in mind that lead to their creation and use, and this only in virtue of the fact that ordinary designers and users exhibit capabilities with corresponding proper functions to produce and utilise the relevant type of artefact.

¹⁰ Artiga contended in 2011 that organisational accounts (such that of Mossio et al.) are dispositional, but more recently (with Martínez), in 2016, he has argued that they are etiological.

¹¹ The official view (supported by KU, § 65) is that Kant's concept of *Naturzweck* implies only two requirements: numbers (2) and (3) in my list, that is, the requirement of, first, (2) what amounts to functionality of the parts with regard to the whole and, second, (3) reciprocal production of the parts within the whole. Yet, according to an insistent indication, a true natural end, additionally, should not be possible under the regime of merely mechanical laws ('er ...

doch zugleich eine Zufälligkeit der Form des Objekts ... in sich faßt', § 74). Kant will infer that the arrangement of the laws of nature in order to make actual natural purposes naturally possible is required for the existence of true natural ends.

¹² I agree with Toepfer on this score (2004, 344–5).

¹³ I agree with Gambarotto (2018) that, contrary to common wisdom, the true vindicator of the Aristotelian concept is not Kant, but Hegel. See also Michelini 2008, 85.

¹⁴ For once, I disagree with Kreines' interpretation (2015) of the concepts of teleology and life in the *Science of Logic*. Kreines claims that the way in which the work argues that an end becomes realised or realises itself is the way in which a species (a type of living being) gives itself actuality when specimens of it reproduce in others of their kind. Like Millikan and Neander, Kreines' Hegel perceives purposes in nature only where this relation between types and tokens occurs (Kreines 2015, 107–8). He dismisses that the chapter on 'Teleology' in the *Science of Logic* provides a general account of the reference-to-a-purpose (*Zweckbeziehung*) in which the burden of proof does not bear on some relation between types and tokens, let alone on the history of types, but on the notion of self-production (viz. the notion of a means that is an end, of a means that serves the realisation of itself). He also overlooks that the 'process of the genus' (or 'generic process') is treated by Hegel, in both his Logic and his Philosophy of Nature, as a process in which externality prevails, in detriment to the inner reference to a purpose. The reconstruction of Hegel's defence of natural teleology by Kreines (2015, 93 ff.) revolves around the thought of an 'intimacy' between type and token. However, Hegel seems to argue against such intimacy: 'im Thier ist diß noch nicht vereinigt, daß die wirkliche Gattung *unmittelbar* als einfachallgemeine, als abstracte da ist; sondern beydes *fällt auseinander*; das allgemeine hat die Form der Individualität, und wo sie diese ablegt, und als Gattung ist, ist sie unwirklich, nicht Subject, und *zerfällt in die Extreme* der in sich beschlossnen totalen Gattung, und der abstracten seyenden; Begriff und Seyn getrennt, und das wirkliche Leben das ihre Mitte ist, steht zwischen diesen Extremen' (GW 8: 175; my emphasis, not Hegel's). In this regard, it seems to me that Spahn (2007) captures Hegel's view more accurately.

¹⁵ It follows that his concept of biological function is not 'theoretical', in the (quite idiosyncratic) sense in which Millikan considers hers to be theoretical (Millikan 1989a), since it does not depend on the truth of an empirical *theory* like the Darwinian theory of the origin of (zoological) species by means of natural selection.

¹⁶ McLaughlin encourages us to pay the price, because he believes that it is the only way to stop an infinite regress in functional explanation (see McLaughlin 2001, 211).

¹⁷ Hegel considers fever as a 'flow' or 'fluidity' of functions ('Fluß der Functionen', 'Fluidisation derselben'), which opposes the 'fixation' of these in disease (GW 8: 181). These concepts fit into the organisational account, unwilling as it is to determine from without the functions of the different organs, willing rather to relativize them and link them to widely distributed current processes.

¹⁸ Work on this paper was funded by the Research Council of the Spanish Government (Research Project PGC2018-093363-B-I00). I would like to thank audiences in Bochum, Parma and Valencia, and two anonymous reviewers of the Hegel Bulletin, as well as the editors of this issue, for numerous suggestions that have improved a previous draft.