CARLO BURELLI
Università del Piemonte Orientale
carlo.burelli@uniupo.it

NORMS FROM NATURE ETIOLOGICAL FUNCTIONS AS NORMATIVE STANDARDS[1]

abstract

When we say that the function of a knife is cutting, we open the door to evaluating knives based on how well they cut. The aim of the paper is to investigate whether functions ground normative standards. This is an exciting question, as it would highlight the important existence of one instance of non-moral normativity and investigate to what degree it involves a trade off with it. Additionally, insofar as it depends on a naturalistic account of functions, functional normativity may be an obvious candidate of non-linguistic normativity that the special issue aims to investigate. The article will first investigate what functions are, providing an etiological account that explains functional attributions for artefacts, as well as biological and social functions. It then discusses how failing to discharge a function results in malfunctioning, not in losing the function. Finally, it argues that functions so understood provide normative standards, independent of moral norms.

keywords

functions, functionalism, normativity, nature, morality, evolution

Introduction   There are many kinds of norms. Alongside the usual moral normativity, many authors identify epistemic normativity, prudential normativity, aim-given normativity or aesthetic normativity as distinct domains (Maynard and Worsnip 2018, 756). This paper aims to defend the view that naturalized etiological functions, in human artefacts and biological and social contexts, ground normative standards independent of and sometime conflicting with moral norms.

Since the earliest teleological outlooks, it has been difficult to reconcile the notion of function with an entirely naturalized view of the world. Functions are not merely descriptive properties of the world, because we attribute them to entities that do not empirically exhibit a specific behaviour. If someone becomes blind, for example, his eyes retain the function of seeing, even if they cannot descriptively perform it. As such, it has been difficult to square our intuitive understanding of functions with an entirely scientific and value-free understanding of the natural world.

Matching the topic of this special issue, functions can instead be understood as non-linguistic norms, emerging from nature. If the etiological account is correct, we might talk about a good eye as an eye that sees well, even if there is no human agent articulating such a point linguistically. Indeed, some etiological accounts argue that some properties count as natural functions, present in the world independently of whether there are human agents present to attribute the function.

In this paper, I first introduce the so-called etiological account, which offers a persuasive explanation of what functions are, and why they can be found not only in human artefacts, but also in biological organisms and in the social world. Although some epistemological skepticism towards this notion is common, particularly in the context of the social sciences, etiological accounts can provide a solid conceptualization.

Secondly, I argue that failure to discharge a function counts as a case of malfunction, rather than non-function. A killer who shoots his victim in the heart may stop the pumping of the blood; it would not, however, change the function of the heart of his victim (Loddo 2016, 295–96). In this case the victim's heart does not lose its function; rather, the heart malfunctions. This distinction serves as a basis for understanding function not merely as descriptive, but as giving rise to non-linguistic (and indeed non-agentive) evaluative standards.

Third, I review different and progressively more complex examples of functional norms: knives, hearts, assassins and soldiers. The aim here is to show that these functional standards operate independently from morality. Additionally, they may conflict with some moral norms and in some cases are so important as to override them.

According to the Oxford dictionary, a function is 'an activity that is natural to or the purpose of a person or thing'. This definition echoes a long tradition of thought, which has viewed functions in terms of teleological final causes. The name 'teleology', despite the Greek etymology, was coined by German philosopher Christian Wolff (1737). The roots of this concept however were intended to reflect back to ancient Grecian thought. Plato, for example, proposed an external teleological conception, insofar as he posits a final cause to be what an intentional external agent desires with regards to some object (any human artefact, or the world as created by the Demiurge). The value achieved by reaching the goal is thus a value from the perspective of that external agent. On the contrary, Aristotle's teleology is more naturalistic, as it does not presuppose an external intention as a source of value. While Aristotle recognized the existence of external teleology, he was more interested in internal teleology, where the evaluation of a goal as good is made from the perspective of the entity whose good is involved, not from that of some external agent (McLaughlin 2001, 17).

This talk of internal final causes is particularly apt when we discuss human artefacts. Something created by human intention is infused by the human goal that motivated the creation. Indeed, the object is brought into being by the planned end in the mind of its creator. Say I want something that cuts. I might seek out a particularly thin rock, hone its edge on a bigger rock and attach it to a wooden shaft . I have thus created a knife. The final cause of the manufact is to cut, because this is the design I had in mind when I started working. The purpose of the knife is cutting, because I forged it with such intention in mind. Finally, I may be a rather clumsy artificer, and the final knife may not be able to cut anything. It is still a knife, however, because I designed it and produced it as such, but it is a very bad one because I failed to do a proper job.

Attributing functions to artefacts is thus quite straightforward, and there is nothing particularly mysterious about such processes. In the classic and medieval era, teleological explanations in terms of final causes were, however, also commonly used to make sense of natural phenomena. Insofar as the world was understood as the creation of an intentional being, God, it was possible to talk about his creation as purposeful in the same way as human artefacts. One could say that the purpose of the heart is pumping blood, insofar as it was designed by God with this goal in mind. This was not an entirely unreasonable belief at the time. Given the extreme mechanical complexity and adaptiveness of various animals, the natural world could be reasonably explained only by some divine agency that purposively designed its marvelous inhabitants. The metaphor of a divine watchmaker was quite common. For this reason, although modern scientific common-sense lead to the exclusion of teleological explanations, the relationship between science and final causes was at the time more complex. For example, while Bacon believed the search of final causes to be a barren enterprise, Newton thought that drawing inferences about God from empirical phenomena did 'certainly belong to Natural Philosophy' (Newton 1934, 546).

A new development began with Darwin, who first realized that there is 'no more design in the variability of organic beings [...] than in the course which the wind blows' (Darwin 2003, 431). Even the prismatic complexity of nature could be accounted for by the simple laws of random mutations and natural selection. God had become an unnecessary hypothesis to explain the seemingly intentional complexity of nature.

However, despite the opposition to teleological causes, implicit references to purposeful mechanisms continue in science to this day, albeit under the less suspicious language of functions. This is not surprising insofar as thinking in terms of functions has a high pragmatic value in two senses.

First, we don't fully understand something until we understand the role it plays in the system, which can be intuitively understood as its function (Cummins 1984; Nagel 1977). Imagine

From teleology to functions

190

some alien were to acquire a human watch. The alien may gain a perfect description of the internal mechanism down to the atomic level without understanding that the watch is aimed at tracking time. Would we say he understands the watch? This is not only true of human artefacts, but also of biological organisms. William Harvey, for example, famously discovered that the function of the cardiac muscle is to pump the blood around the body. Before him, did we really understand the heart?

Functions may be useful in science for another, opposite reason. Postulating some function may lead to genuine scientific discovery when the scientist seeks out the mechanism through which the supposed function is carried out. We may discover a new species of animal without eyes, and it might be worth investigating what specific organ discharges the function of sensory perception; the answer may be as strange as echolocation in bats or electroreception in some fishes. To give a historical example, scientists discovered the existence of RNA when they were seeking the mechanism that performed the function of protein biosynthesis (Enc 1979, 354–56). The hard question is whether this pragmatic usefulness of function is a mere heuristic or whether it can play a proper causal role in a scientific explanation. In light of such considerations, Hempel, for example, saw no reason 'for denying the status of explanation to all accounts invoking occurrences that temporally succeed the event explained' (Hempel 1965, 353–54). However, Hempel also denied that functions do in fact count as valid explanations. Searle (1994; 2010) also famously disputed the idea that biological functions are properly natural, arguing that they always depend on a particular human observer, who attributes them in light of an explanation that depends on his intention.

To vindicate the use of functions in biology and, to a lesser degree, in social sciences, however, Searle's subjectivism of functional attribution will not be sufficient. As a consequence, a lively academic literature has recently developed seeking to defend functions in a naturalistic way, deprived of intentional presuppositions. The intuition is that after Darwin we must give up the idea of natural design but not necessarily of function (Davies 2003).

A first attempt at such a reconceptualization of function is the one provided by Larry Wright (1976, 81)[1]:

(a)   X is there because it does Z,
(b)   Z is a consequence (or result) of X being there.

This understanding of functions intuitively fits human artefacts insofar as they come into being because they were designed with a purpose in mind. The idea in the mind of the creator counts as an *ex ante* cause that crucially contributes to the existence of the manufact. Consider the microwave as an example of human artefacts:

'The function of microwaves is heating food' means

(a)   Microwaves are there because they heat food,
(b)   Some food being heated is a consequence (or result) of microwaves being there.

Yet, thanks to natural selection, this notion of function also fits the biological world: pumping blood is what explains why we have hearts, even if no one designed hearts for such a purpose. Phrasing it in terms of Wright's definition:

---

1 An extensive literature followed Wright's account. For an overview, see for example (Allen, Lauder, and Bekoff 1998; Andre Ariew, Cummins, and Perlman 2002; McLaughlin 2001; Moreno and Mossio 2015, 65–69). For a more critical overview, see (Piasentier 2020).

'The function of the heart is pumping blood' means:

    (a)   The heart is there because it pumps blood,
    (b)   Pumping blood is a consequence (or result) of the heart being there.

Functions in this sense are not simply properties of things but features that explain the existence of things. Such an account came to be known as etiological because it is both causal and historical. In short, in order for something to be considered a function, it must have a disposition (a) and a feedback (b). By disposition is meant that all Xs have a tendency to Z. All hearts have a tendency to pump blood. Some may do it better than others, and in rare cases some hearts do not pump blood at all. Yet on average hearts do tend to pump blood. However, the innovative focus is on the feedback condition, which makes this notion of function historical. It is not enough that Xs tend to Z, but it must be the case that Z is something that causally contributed to Xs being around. To be more concrete, it is not enough that hearts tend to pump blood around. It must be the case that pumping the blood contributes to the existence of hearts. Hearts in fact also have a tendency to emit beating sounds, yet this seems intuitively a mere accidental quality, rather than a function of the heart. The etiological account explains this intuition without referring to a divine design or mysterious final causes of the heart. While pumping the blood was causally instrumental in the historical spreading of hearts, emitting beating sounds was not.

Recall the epistemic skepticism towards teleology, insofar as the cause seemingly comes after the effect. This is not a problem for artefacts. Insofar as human intention comes prior to the manufact's creation, there is no ex post causation. However, ex post causation was a major problem for natural functions, because, absent a divine creator, there is no cause *ex ante* to explain the result. How can the pumping of blood explain the existence of hearts, if before hearts came to be there was no pumping of blood? The latter cannot really be a cause of the former, if it existed only after the former came into being. The process of natural evolution, however, provided a neat way to respond to this methodological difficulty: random mutation is the true causal mechanism which explains how the pumping of blood emerges in hearts, while natural selection explains why this then spreads to other organisms (Mahner and Bunge 2001). Wright's account thus solves the problem of the epistemically suspicious retroactive causation of teleological final causes for natural objects.

The same doubt about ex post causation affects the credibility of applying etiological functions to the social realm. Functional explanations were popular in political science during the late 1960s and 1970s (Parsons 1991; Luhmann 1995; Easton 1965). Yet many epistemological doubts were raised against sociological functional accounts, even by those like Jon Elster who accepted them in the life sciences (Elster 1994). Part of the problem is that functional explanations defied the explanatory golden standard of methodological individualism, i.e. the idea that only individuals command autonomous causal power[2]. Yet the most difficult point was that while natural selection provides a mechanism that explains why function can be causally relevant in explaining the existence of function bearers, no comparable mechanism was offered in the social sciences. However, there does not need to be anything mysterious about selection in human contexts. A famous and widely used model of explanation is the 'invisible-hand', which precisely applies the evolution scheme to the social world and explains

2 See: 'in sociological work these collectivities must be treated as solely the resultants and modes of organization of the particular acts of individual persons, since these alone can be treated as agents in a course of subjectively understandable action' (Weber 1978).

seemingly purposeful effects that were not produced by intentional design. In this case, the mechanism at play is usually a filter or strategic equilibrium, that allow only some variations to survive (Nozick 1974, 18–22). The problem of the missing mechanism in the social sciences partially disappears when one considers carefully what it is thought to explain. According to Pettit, functions do not explain the existence of a phenomenon but rather its resilience, i.e., its resistance to existential shocks (Pettit 1996, 291). This is not very different from the natural world, where functions are relevant because of natural selection, but the *ex ante* generative cause is random mutations. Additionally, the importance of evolution in explaining group behavior is currently rising. Biology classically questioned the possibility that natural evolution could apply to groups. As evolution was properly grounded on gene mutations, it was meant to apply to single genes, to individuals, or at most to genetic kins. However, Darwin explicitly considered group selection an important domain[3], and recent development are trying to expand the scope of evolutionary explanations to encompass groups (Nowak, Tarnita, and Wilson 2010), and even the historical dynamic (Turchin 2003).

Malfunctional and non-functional

In artefacts it is quite straightforward to talk about some 'anticipated good (or apparent good) that the function bearer serves (or is thought to serve) that helps to explain why it is there' (McLaughlin 2001, 57).

Wright's analysis of function was, however, aimed at expelling not only divine final causes but also all evaluations. Contrary to other accounts[4], Wright intended to explain why some property is a function without reference to the welfare of the organism. To see why this is the case consider the following example.

The fur of a polar bear has the function of retaining heat, even if the polar bear dies from heat stroke at the equator, which would obviously be a negative consequence in terms of the welfare of the bear. Thus, even if under normal circumstances a performed function is beneficial because it allows the organism to thrive, under extraordinary circumstances it may harm the organism.

Now let's consider the opposite case. A polar bear has a mutation that produces many extra glands that secrete excessive transpiration. This counts as a deadly genetic disease in the polar circle, because cubs with this variation do not survive. Suppose the variant polar bear is brought to the equator before it dies. Here its condition is actually an advantage. Not only the bear's welfare but also its fitness is improved. Would we say that he acquired a new function, that the function of the extra glands is to secrete excess heat? According to the historical account we could not. The trait has not been selected for this yet. However, if the bear thrives in the new habitat, and reproduces, spreading the condition, it will be properly be called a function in subsequent generations. In conclusion, it still seems true that a trait which is not functional is beneficial to the organism.

---

3 It must not be forgotten that although a high standard of morality gives but a slight or no advantage to each individual man and his children over other men of the same tribe, yet that an increase in the number of well-endowed men and advancement in the standard of morality will certainly give an immense advantage to one tribe over another. There can be no doubt that a tribe including many members who, from possessing in a high degree the spirit of patriotism, fidelity, obedience, courage, and sympathy, were always ready to aid one another, and to sacrifice themselves for the common good, would be victorious over most other tribes; and this would be natural selection. At all times throughout the world tribes have supplanted other tribes; and as morality is one important element in their success, the standard of morality and the number of well-endowed men will thus everywhere tend to rise and increase. (Darwin 2004)

4 For Hempel (1965), Nagel (1977), Ruse (1971) and Elster (2003) one of the essential aspects of functional explanation was the beneficial relation of the function bearer to its containing system. Such considerations however are more difficult to square with a natural view of the world.

Contrary to Wright's intention, other scholars developed his account to include normative evaluations. Yet they do so in a way that does not refer to the welfare of the organism. Ruth Millikan (1989) focuses on feedback (b), while she is somewhat skeptical about the need to ascertain the probabilistic tendency (a). According to her, the primary mechanism of feedback is reproduction. In her conception of 'proper function' (Millikan 1989) the function bearer needs only the right kind of previous history, not necessarily the right kind of present and future. In other words, it needs to have contributed to the past reproductive success of the thing, but it needs not contribute to the present or future reproductive success. Say we move to a strange planet, with weird gravity laws that make the pumping of the blood damaging to the body: the heart will maintain its function, even if it becomes damaging to the organism. A more realistic example is the mule's heart, which has the proper function of pumping the blood even though the mule is sterile, and the heart does not contribute to its reproduction at all.

Functions thus appear quite different from mere descriptions[5]. A microwave's function is heating food, even if it is never used to heat food. I could use my microwave as a drawer for my socks, and yet its function will remain heating food. The reason is that being used as a drawer for my socks is not why my microwave was created. I may also never take the microwave out of the box to use it. Yet heating food is still what explains why that microwave came to be. Heating food is still the function of my microwave even if it is broken, or if it has always been broken (Hardcastle 2002). As Karean Neander puts it: 'To attribute a natural function [...] to something is to attribute a certain kind normative property to the thing. That is, to attribute an evaluative standard to it that it could fail to meet, even chronically (i.e. systematically and consistently and even under ideal circumstances)' (Neander 1999, 14).

The important point here is that tokens may fail to discharge their functions, or they may not have that function. A species living in a dark cave may lose its sight in later generations. Its residual eyes do not have the function of sight. Quite the opposite, the eyes of a blinded animal outside the cave retain the function to see, even if they cannot discharge it any longer. Historical accounts, as we have seen, perfectly account for this difference between malfunction and non-function[6].

If Millikan and Neander are right, it is acceptable to speak about malfunctioning in entirely naturalistic terms. As such, functions do operate as natural normative standards: standards of good and bad performance, independent of the observer's intention or linguistic description.

Functional Normativity

What I call 'functional normativity' is the normative judgment that something counts as good when it performs its function well. This seems independent from moral standards and it might even take priority over them in some cases.

Consider the case of a knife. Knives are designed to cut; therefore it is safe to say that their function is cutting. In this very basic sense, a (functionally) good knife is a knife that is good at cutting (Thomson 2015, 69).

There are many other qualities, based on which one might positively evaluate a knife: being durable, light, well balanced, aesthetically pleasing, etc. A knife, however, that satisfies all

---

5 Indeed, functional attributions are often examples of 'cryptonormative judgments' (Worsnip 2017).

6 In social cases it is admittedly more difficult to distinguish malfunction and non-function. One reason for this is that, as I have already remarked, it is more difficult to talk about natural selection. A different reason why it is more difficult is that people may disagree about what a social function should be. Those accounts that view functions as not genuinely natural, but superimposed by the interest of the researcher, cannot properly admit of social functions, insofar as people under a sort of social institution will disagree about whether it should have a function. In sharp contrast with etiological functions, these accounts do not allow a distinction between malfunction and non-function.

these other desiderata, but fails its function of being able to cut, will not count as a good knife. As there is a pluralism about moral outlooks (Berlin 1998), there could be a pluralism of knives: possibly all these different evaluative considerations cannot coexist in a single knife, and people may reasonably disagree about how to rank them. Yet the ability to cut seems particularly important, almost constitutive of being a knife.

The example of knives elucidates how the functional standard is not reducible to moral standards. Intuitively, the ability to cut well is not a moral property at all and is only pertinent when we evaluate knives: being able to cut will likely be a disvalue in a microwave or in a human being.

Regarding the previous analysis of etiological functions, a similar reasoning also applies to biological context. The case of hearts provides a good example of functional normativity, in which the subject is much more important to us than knives are. If the heart's function is pumping blood all throughout your organism, a good heart is one that performs this task well. A bad heart, one that fails to pump blood around the body satisfactorily, is something we have reasons to fix. Unlike the case of the knife, we care a lot about having a good heart. A bad heart, in fact, threatens our very survival.

As in the example of knives, moral considerations seem completely separated from the functional goodness of hearts. The functional standard applies regardless of whether we want the particular person to survive. Hitler's heart is good if it pumps his blood well. We may however have other reasons to want Hitler's heart to be a bad heart.

Knives and hearts illuminate how functional standards can be detached from moral standards, yet they do not adequately convey the possible tension and trade-offs between the two. Moving to the social world, imagine instead the extreme example of a good assassin. It could be argued that the function of an assassin is killing people on demand. A good assassin, therefore, in an intuitive sense, is someone who is good at killing.

Assuming that morality requires not killing people for money[7], then a good assassin cannot be a good man. Being a good man, in fact, requires not performing the function that assassins enact. This example demonstrates quite vividly that functional standards can be in clear tension with moral standards. In this case, either the functional or the moral standard can be satisfied: a good person cannot be a good assassin, and a good assassin cannot be a good man. We do not care about good assassins like we care about good hearts. The possible conflict between moral and functional normativity is straightforwardly resolved in favor of morality, and the conclusion is that there should not be assassins.

Imagine a less sinister example: a good soldier. If the function of a soldier is exerting organized violence, a good soldier is someone who can do so effectively. We can acknowledge that the Wehrmacht in WW2 had many good soldiers, even if we deem Nazi Germany's goal repugnant. There are indeed other moral dimensions upon which we assess soldiers. We may believe that being a *morally* good soldier overall requires one to fight in a just war, or to fight reasonably justly. Yet this would define the requirements of a good person who happens to be a soldier. Imagine someone who fully respects *ius ad bellum* and *ius in bello* but is completely incapable of fighting. Such a person would hardly qualify as a good soldier. In some ethical outlooks, the functional and moral normative demands may even be incompatible. Let us assume morality requires a good person to categorically abstain from inflicting harm against other human

---

7 We may assume the contrary: that using lethal violence is morally justified under some circumstances. A morally good assassin would be someone who only kills victims who deserve to be killed (e.g. Dexter, the tv-series serial killer). However, if such a person were a completely inept killer, it would still be strange to qualify him as a good assassin, despite him being a good man who tries to be an assassin.

beings. In this case, one cannot be a good person in the moral sense and a good soldier in the functional sense. In a similar sense, Machiavelli claimed that a good Christian might be a good person but cannot be a good politician (Berlin 1972, 45–47; Machiavelli 2013).

Unlike in the case of assassins, we cannot as easily conclude that if a good person cannot be a good soldier, then there should not be soldiers. Many would agree that soldiers are necessary for the survival of political institutions in a competitive international environment. Thus, like in the case of the heart, we do care about good soldiers for our survival.

One possible objection to this is that this argument is still moral 'all the way down'. The reason why the functional normativity of specific functions matters may depend on the 'moral goodness' of said functions. In other words, we accept the functional standard of soldiers and reject that of assassins because soldiers are morally warranted, while assassins are not. I do not believe that there are good and bad functions *simpliciter*, but the moral goodness of a function largely depends on the context. A function, say the ability of soldiers to fight, may be morally acceptable or even required in some cases, but morally unacceptable in others. Yet even a soldier who fights for an unjust war may still count as a good soldier in a technical functional sense. Conversely, being a good assassin may be useful in morally acceptable cases (e.g., to block a trolley with a fat man or to kill Hitler).

One may also worry that functional normativity leads to an 'almost unlimited proliferation of kinds' (Maynard and Worsnip 2018, 361); each function would elicit its own normative standard. There are virtually unlimited functions, and thus, the critique may go, virtually unlimited normativities. The response here would be that the broad category is functional normativity, and proliferation is only in instances of functional normativity. Similarly, there is only one broad category of prudential normativity, even if it involves different prescriptions for each person.

Conclusion

In conclusion, this paper argued that functions should be conceived as features that explain the existence of things, and this is not a merely descriptive notion. On the contrary, etiological functions ground normative standards that may be independent from morality (like knives) yet important to us (like hearts). They might conflict with moral norms (like assassins), and even take precedence over them (like soldiers).

REFERENCES

Ariew, A., Cummins, R. and Perlman M. (2002). *Functions: New Essays in the Philosophy of Psychology and Biology*. Oxford: Clarendon Press;

Berlin, I. (2013). The Originality of Machiavelli. In H. Hardy (Ed.), *Against the Current: Essays in the History of Ideas* (pp. 33-100). Princeton: Princeton University Press;

Berlin, I. (1998). On the pursuit of the ideal. In I. Berlin, *The Crooked Timber of Humanity: Chapters in the History of Ideas* (pp. 1-20). Princeton: Princeton University Press;

Cummins, R. (1984). Functional Analysis. In E. Sober (Ed.), *Conceptual Issues in Evolutionary Biology* (pp. 386–407). Cambridge, MA: MIT Press;

Darwin, C. (2003). *On the Origin of Species*. Calgary: Broadview Press;

Darwin, C. (2004). *The Descent of Man: Selection in Relation to Sex*. New York: Penguin Classics;

Davies, P. S. (2003). *Norms of Nature: Naturalism and the Nature of Functions*. Cambridge, MA: MIT Press.

Easton, D. (1965). *Systems Analysis of Political Life*. New York, NY: John Wiley & Sons Ltd;

Elster, J. (1994). Functional Explanation: In Social Science. In M. Martin and McIntyre L. C. (Eds), *Readings in the Philosophy of Social Science* (pp. 403–14). London: MIT Press;

Elster, J. (2003). Marxism, Functionalism, and Game Theory. In D. Matravers and J. E. Pike (Eds.), *Theory and Society*. London: Routledge;

Enc, B. (1979). Function Attributions and Functional Explanations. *Philosophy of Science,* 46 (3), 343–365;

Hardcastle, V. G. (2002). On The Normativity of Functions. In A. Ariew, R. Cummins and M. Perlman (Eds), *Functions: New Essays in the Philosophy of Psychology and Biology* (pp. 144–56). Oxford: Oxford University Press;

Hempel, C. G. (1965). *Aspects of Scientific Explanation.* New York: Free Press;

Loddo, O. G. (2016). Assigning Functions: Agency and Normativity. *Sistemi Intelligenti,* 28 (2–3), 293–318.

Luhmann, N. (1995). Social Systems. Stanford: Stanford University Press;

Machiavelli, N. (2013). Il Principe - The Prince - Italian/English Bilingual Text. Milton Keynes: JiaHu Books;

Mahner, M., & Bunge M. (2001). Function and Functionalism: A Synthetic Perspective. *Philosophy of Science,* 68 (1), 75–94;

Maynard, J., & Worsnip A. (2018). Is There a Distinctively Political Normativity? *Ethics,* 128 (4), 756–87. https://doi.org/10.1086/697449;

McLaughlin, P. (2001). *What Functions Explain: Functional Explanation and Self-Reproducing Systems.* Cambridge; New York: Cambridge University Press;

Millikan, R. G. (1989). In Defense of Proper Functions. *Philosophy of Science* 56 (2), 288–302;

Moreno, A., & Mossio. M., (2015). *Biological Autonomy: A Philosophical and Theoretical Enquiry.* Dordrecht: Springer Verlag;

Nagel, E. (1977). Teleology Revisited. *Journal of Philosophy*, 74, 261–301;

Neander, K. (1999). Functions and Teleology. In V. G. Hardcastle (Ed.) *Where Biology Meets Psychology: Philosophical Essays* (pp. 3–26). Cambridge, MA: MIT Press;

Newton, I. (1934). *The Mathematical Principles of Natural Philosophy.* Berkeley: University of California Press.

Nowak, M. A., Tarnita C. A. and Wilson E. O. (2010). The Evolution of Eusociality. *Nature,* 466, 1057-1062;

Nozick, R. (1974). *Anarchy, State, and Utopia.* Oxford: Blackwell;

Parsons, T. (1991). *The Social System.* London: Routledge;

Pettit, P. (1996). Functional Explanation and Virtual Selection. *The British Journal for the Philosophy of Science,* 47 (2), 291–302;

Piasentier, M. (2020). As the Blowing of the Wind. Biological Functions and Natural Selection. In M. Piasentier (Ed.), *Biopolitics: Between Nature and Language.* Abingdon-on-Thames: Routledge;

Ruse, M. E. (1971). Functional Statements in Biology. *Philosophy of Science*, 38 (1), 87–95;

Searle, J. (1994). *The Construction of Social Reality.* New York: Simon and Schuster;

Searle, J. (2010). *Making the Social World: The Structure of Human Civilization.* Oxford: Oxford University Press;

Thomson, J. J. (2015). *Normativity.* Chicago: Open Court;

Turchin, P. (2003). *Historical Dynamics: Why States Rise and Fall.* Princeton, Oxford: Princeton University Press;

Weber, M. (1978). *Economy and Society: An Outline of Interpretive Sociology.* Berkley: University of California Press;

Wolff, C. (1737). *Vernünfftige Gedancken von den Absichten der natürlichen Dinge.* Frankfurt und Leipzig: Rengerischen Buchhandlung;

Worsnip, A. (2017). Cryptonormative Judgments. *European Journal of Philosophy*, 25 (1), 3–24. https://doi.org/10.1111/ejop.12208;

Wright, L. (1976). *Teleological Explanations.* Berkeley: University of California Press.