

THE RATIONALITY OF BEAUTY: AESTHETICS AND THE RENAISSANCE OF TELEOLOGY

by Humberto Schubert Coelho 

Abstract. As is well-known, the mechanistic ontology associated with the work of Descartes and Newton also challenged the irreducibility of final causes. This challenge undercut objective justifications of goodness and beauty. As one result, aesthetics has since been viewed largely or wholly as a subjective matter. In this article, however, I argue that the anti-teleological turn has now been undermined because of new discoveries in sciences. I argue therefore that the claim can no longer be made that science compels us to reject classical and objective accounts of goodness and beauty in aesthetics. Such developments are important to a wide range of fields, including aesthetics and metaphysics, as well as science and religion.

Keywords: beauty; mechanism; purpose; teleology

SOME CLASSICAL IDEAS ABOUT OBJECTIVE AESTHETICS

Plato, the first-known philosopher to argue philosophically about beauty, defined it as the property of the good that allows the good to be apprehended and admired (Plato [*Phdr.* 250b–251]). Because goodness and beauty are closely related in Plato's understanding, beauty cannot be related to evil, and ugliness cannot be related to goodness. Hence, the realities of goodness and beauty cannot be separated; what is good is beautiful and what is beautiful is good.¹

Good, for Plato, meant something that manifests a permanent order, not corrupted by transitory accidents, and this revelation is only possible if things are objectively and naturally regulated, according to an intrinsic order. On this account, goodness, and for that matter beauty, are associated with the perception of objective laws, intrinsic order and form.²

Aristotle followed a similar approach, arguing that order, symmetry, and definiteness are the chief forms of beauty. He also highlighted the connection between good order that is appreciated by the senses and by the intellect. In the same paragraph, (*Met.* XIII [1078a36]), Aristotle also

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makes a distinction, attributing good to what is comparatively active while beauty is more commonly attributed to what is passively apprehended. As a modern example, a carefully prepared meal may be described as good for its contribution to the nourishment and hence activity of the body, but it may also happen to be beautiful insofar as the food has been attractively presented to the guests. In this example, the nutritional function plays the role of an active good, while the attractive appearance plays the role of the passive, contemplative good associated with beauty.

Given that Aristotle has a nonunivocal conception of being, and therefore also of goodness, as in the phrase, “Good is spoken of in as many ways as being is spoken of” (*Nich. Eth.*: 1, 6, 1096a24), there are many ways for Aristotle to attribute goodness and also beauty. As well as what is physically well-ordered, it is possible and even commonplace for the intellect to apprehend beauty in the balance and proportion of an equation or a text, or in the fairness, morality, and sublimity of moral behavior. In other words, reason judges many ways in which a thing can be good just as, also according to Aristotle, there are many ways in which a thing can be said to be. Examples include a pleasant appearance, competence, mathematical balance, excellence, creativity, and beauty.

Just as goodness is frequently described by heuristics or laws that explicitly connect it with the fully developed forms of things, according to Aquinas’s development of Aristotle, it is plausible that beauty is also preferentially attributed to such forms³. In nature, for example, many living and growing things achieve comparatively symmetrical states in their final forms, just as also happens in many artistic works. Conversely, what is rotten, decayed, or damaged, as in the case of fruit attacked by insects or rot, will tend to be characterized by a loss of the symmetry associated with beauty. Hence, there is at least a tacit expectation that the achievement of an end, traditionally identified as the *final cause*, is associated with an objective symmetry that is generally also associated with beauty.⁴

Since the apprehension of good tracks the proper form of a being, and since the proper form of a being is what is often good *for us*, it is unsurprising that such apprehensions of good are also associated with varieties of pleasure. It is plausible that there is an intellectual pleasure associated with symmetry, insofar as symmetry involves reducing a complex world to comparative simplicity, which is pleasing for the mind. It is also plausible that there is sense pleasure associated with the apprehension of things that are in a fully developed form that is good for us, such as a ripe apple. Moreover, there may be pleasures that are trained from experience as individuals or as a species, such as the aesthetic pleasure associated with the special color of a ripe apple, possibly also combined with the pleasure from a foretaste of eating the apple.

As this example shows, goodness can be apprehended as beautiful and experienced in many pleasurable ways while being rooted in the proper

and fully developed form of a being. In other words, beauty, at least in this example, is rooted in something objective rather than being added as a subjective judgment alone. Moreover, also on this account, goodness is said in many ways, and something or someone may be in a good state in terms of one category of being while being in a bad state in another category. For example, a person may be fit and well, which is good, but also in prison, which is bad for that person, while this condition may also be an instrumental good if this imprisonment protects others.⁵

For Aquinas, we can only desire what is good, but we may fail in intellect or will about the true goodness of the things we are considering, given their broader context. For example, we may fail to consider or deliberately choose to ignore the harms attached to present and pleasant actions, such as an adulterous kiss. As a result, Aquinas says “the end is a good, or something that seems good” (*ST I-II.8.1*).⁶ If we pursue the latter, something that only seems good, the result can be that disordered relinquishing of other and greater goods that is *evil*.⁷

Such considerations, namely, that something can be good and seem good, but can also be evil and seem good, give rise to a distinction between goodness and beauty that is drawn by Aquinas but is not so clear in Plato. On this account, beauty is perceptible goodness, which can sometimes be mistaken. Hence, in the Thomistic tradition, goodness is described as a transcendental, but beauty is normally described as a pseudo-transcendental.⁸

Nevertheless, even if beauty is only a pseudo-transcendental, Aquinas, Plato, and Aristotle all agree on the main point. Whether it is true or only perceived, the goodness to which beauty is ascribed is something objective. Moreover, this goodness is closely associated with the fully developed form of a thing, namely, its final cause.

MECHANISM AND THE KANTIAN REVOLUTION

Given that aesthetics is impacted by considerations of final causation, what has happened to aesthetics since the decline of final causation in the early modern period?

As is well-known, in recent centuries, and especially as a consequence of the way modern philosophy developed under the banner of mechanism, from Descartes to Kant to Positivism, there was a decline in the tendency to concede any distinct place for final causation.⁹ For example, it was discovered that simple two-body systems, such as a falling rock that can be pictured in terms of simple teleology, can equally be well-described in terms of forces, without any formal or discernible goal. Hence, for example, time is often described as symmetric in these simple systems, with temporal progress and regression being equivalent in terms of physical behavior. With a decline of final causation, with its systems unfolding or

evolving into distinctive final forms, the Aristotelian system of fourfold causation that held the disciplines together—from theology to science and from art to ethics—was challenged, and the classical account of objective beauty also seemed threatened.

The significance of this revolution and the special issue of biology was underlined, in particular, by Immanuel Kant's third critique, a book that dealt with biology and aesthetics and attempted to answer the radical ontological dualism that he himself had helped to produce with his philosophy. The issue Kant tried to address was as follows. How can we reconcile our perception of ends in nature, whether in biology or aesthetics, with (as he saw it) an objective reality reducible to the blind, mechanistic forces of Newtonian mechanics?

As is well-known, Kant's solution was his famous transcendental turn. According to the transcendental turn, in an objective reality without end-directed action, it must be the mind that gives order to nature. In his *Critique of Judgment* (1790), Kant argued that our minds are constituted to operate in two very distinct ways: the cognitive function that understands objects (according to the laws of physics of the eighteenth century) and the practical function that gives rules to action (Kant 2003, 16). The functions correspond, respectively, to a "world of physics," responsible for our scientific (i.e., Newtonian) understanding of the laws of nature, and a "world of freedom," responsible for our behavioral reasoning, the same kind of reasoning that we also project onto biological nature.

A few more comments are important regarding the extension of this project to biology. Kant claims, for example, to have found space for biology in the bridging between theoretical and practical realms, as when he says that the faculty of judgment "cannot form knowledge about the nature, for it does not possess its content. It can only reflect on it in a hypothetical-contemplative way" (Kant 2003, 25).¹⁰ Kant goes on to say that we do not properly understand biological nature, because it cannot be fully reduced to the laws of physics and shows some semblance of freedom. This is the reason why the third critique deals with aesthetics and biology, an association that might seem eccentric for those not informed about Kant's ontological dualism and its need to deal with the special case of apparent teleology. Instead of detecting these "seeds of freedom" as an evidence of a more organic and spontaneous ontology, Kant remains loyal to his philosophical project. In particular, he continues to categorize the connection of nature and subjective properties, such as the ascription of goals and purposes, as speculative, contemplative, and hypothetical. Kant places this speculative knowledge in opposition to proper knowledge, which refers to objects as bodies of a mechanical system (Kant 2003, 25). Freedom and end-oriented processes in nature, therefore, are explained as abstract connections between the physical world of mechanic determinism and the mental world of freedom.

With objective reality, including the seemingly end-directed world of biology, reduced to mechanism, aesthetics was subjected to the same treatment. In particular, Kant stresses that *Zweckmässigkeit* (purposiveness), the purposiveness of an object, the characteristic that renders it beautiful, is not a quality of the object itself, but of our reflection on it. That is to say, the intellectual sense of purpose and adequacy that attracts us to an object is a mental construction of our imagination (Kant 2003, 34). In other words, although we may discern teleology, purposiveness, and beauty, in reality, for Kant, these seem to be rather weak transpositions of moral thinking to aspects of the natural world. On this account, the transcendental turn for Kant represents a belief that the objective issue of a mechanistic reality has been settled once and for all, as in his comment in the *Faculty of Judgement*: “there will never be a Newton of the blade of grass” (Kant 2003)¹¹. This turn was a subjective one for aesthetics as well as biology, with any residual appeals to objectivism often seen as an inappropriate appeal to natural theology. This issue has been one with which many thinkers, such as C.S. Lewis in *The Abolition of Man* (Lewis 1943), have continued to wrestle into modern times.

GOETHE AND THE RENAISSANCE OF TELEOLOGY

As some traces of mechanism persist, the charges against teleology are still imbedded with associations between teleology and personalistic or arbitrary divine interventionism, as is still shown in comparatively recent publications. For example, a recent paper by A. Werth and D. Allchin argues that teleological views are compromised by normative judgments of natural processes and that teleology is associated with a stereotype of placid balance opposed to (supposed anti-teleological) conflicts and disproportions in nature (Werth and Allchin 2020). Moreover, in certain fields such as biology, finalistic arguments are often dismissed as instances of, at best, “teleonomy”¹² or *apparent* teleology.

Nevertheless, although attractive to much subsequent thought, the Kantian understanding of teleology was strongly criticized (Wattles 2006), even by some of his contemporaries. In the specific case of aesthetics, the theoretical shift proposed by Kant did not extend equally to the whole domain of being and subjectivism was never completely dominant. The nineteenth century was very rich for the arts, from opera to architecture. Moreover, many artists were nostalgic for the classical notions of “forms with purpose,”¹³ and a key feature of artistic theories in this romantic age was their association with biological teleology. In addition, aesthetic judgments of actors and performers of music or drama remained consistent enough to be treated as if at least some objective criteria persisted.

Johann W. von Goethe (1749–1832), who was not only a famous poet, but also a natural scientist, contributed much to the continuing

association between biological sciences and aesthetical theory. Goethe opposed Kantian strong dualism by saying that end-oriented processes were not mere ideas in our minds, but natural processes that we could *see* rather than merely conceive. By the time that Kant's *Critique of Judgement* was published, Goethe was working on his *Metamorphosis of Plants*, one of the most influential books in biology and the philosophy of biology during the eighteenth century in Germany.

Regarding aesthetics, Goethe conceived beauty as a concrete property of an object's form, that is, the fitness and appropriateness of the object to its context and functions, in contrast to both Kant and the later relativist subjectivism.

According to Goethe, Kant's genius in connecting natural teleology and art was one of the greatest steps in history for both biology and aesthetics. He also argued, however, that Kant's preference for analytic reasoning¹⁴ over dialectical (synthetic) reasoning had given rise to a false belief: the idea that integration in complex systems was an artificial construct of the mind (Goethe 2003). Indeed, for Goethe, Kant's assumption that real knowledge should be analytical—a consequence of Newtonian mechanism—made him blind to synthetic understanding, the capacity to see the general and organic connections between disciplines and phenomena (Caro 1866, 111). On Goethe's account, we do not and cannot actually understand complex and multifactor phenomena, such as weather and biological growth, simply by separation of "parts" and the study of their individual movements.

As an example of Goethian reasoning, consider, for example, what is meant by the organs of a living being. In a very dialectical way, organs only make sense and have a role in an organism, and vice-versa. There is no truly meaningful "organism-less organ." But thinkers of that time already disputed if organs should be considered parts, exactly in the sense that machines have parts. Instead, most organs have or are associated with "subordinated ideas," functioning under the banner of a larger idea, namely, the form or internal "program" of the organism. So, Goethe arrived at the notion of the *Urphänomen*, the "primal phenomenon," which regulates the type of being that we see. The *Urphänomen* is the hierarchically higher idea that regulates subordinated ones as organs, which have no meaning without their hierarchical superior. In other words, kidneys and leaves make absolutely no sense in themselves, and have no proper meaning in themselves separated from animals and plants. This approach resembles that of Aristotelian entelechy and Platonic pure forms, but updated to accommodate new biological insights.

In the *Metamorphosis of Plants*, therefore, Goethe argued that plants are not "caused" simply by pulling and pushing of their parts, as in a Newtonian system (Goethe 2003, 117). They do not produce bananas or nuts because of any exterior kinetic impact, but according to an inner

drive, a formative “idea” or plan that is internal to their very being. The thing plants are—their *Urphänomen* (archetypal phenomenon) —include final causes in their being, most clearly in the way their growth unfolds in the direction of a specific final form.

Goethe was the first to conceive the idea of metamorphosis, that is, that living beings move and define themselves essentially through metamorphosis instead of reception of effective causes. Metamorphosis refers to the immanent push for perfection, the way in which living beings move *from inside* and *aiming* for the form they want to achieve.

The wisest thinkers and scientists had been failing to discern this, Goethe thought, because the philosophy of the time had lost the capacity of observing and learning *from* nature. Excited with the successful model of physics and astronomy of the last 200 years, the generation of the turn of the nineteenth century had excessive trust that their method corresponded to the only way human beings could understand nature; more than that, the only way nature itself could work.

It was, thus, of capital importance to return to the term “phenomenon” as manifestation, and not, as Kant puts it, as a mere appearance (Goethe 2003, 5, 19). For, if we understand that living beings and other phenomena are “telling” us aspects of nature we would approach them more humbly and would question our theories more frequently¹⁵.

Goethe ultimately connected these insights on biological teleology to aesthetics, arguing that beings that seem to be more capable, with the capacity of imminent self-perfecting action, are also more appreciated by our aesthetical judgment. In other words, he invented new ways to sustain the classical notion of beauty as an apprehension of the natural end or goodness of the thing. The inference that freedom, spontaneity, or “ease” is a mark of proximity to the final causes of the thing is not original (Aristotle *Physics*, Book II, part 4–6), but Goethe expressed it in the language of the natural science of the time, in a way that resembles some contemporary attempts to explain inclinations based on evolutionary pressures and the agency-detection ability. In fact, Goethe’s natural philosophy by no means reject or distorts the naturalistic approach, but improves it emphasizing how goals are intrinsic to the organizing principles of living beings.

In his essay, *Inwiefern die Idee: Schönheit sei Vollkommenheit mit der Freiheit, auf organische Naturen angewendet werden könne*, (How far the idea: Beauty is perfection with freedom, can be applied to organic nature) (Goethe, 16), he proposed that our sense of beauty (our aesthetic “organ”) is mostly oriented to the apprehension of freedom, and such freedom is best understood as the self-actualization of a being, since freedom is the faculty that expresses, in particular, intelligent order and life. So, the apprehension of beauty is linked to the apprehension of organic teleology and its associated fullness of good order and maximal freedom¹⁶. The higher that beings are in the scale of living beings, the more freedom they enjoy;

and the more freedom they enjoy, the greater is the demand for organs that fulfil the need to express this freedom.

Goethe's romantic biology (or philosophy of nature) had a decisive impact on the biology of the nineteenth century, influencing Ernst Haeckel, the German zoologist, who discovered more than a thousand species and who popularized Charles Darwin's and Alfred R. Wallace's ideas about natural selection and evolution. Haeckel, in his turn, helped convince Darwin about the importance of Goethe's idea, which many at the time appreciated as commonsensical (Richards 2003, 93–95). Although *The Origin of Species* only mentions Goethe in the appendix, discussing his notion of compensation, the historian of biology Robert Richards argues that the first evolutionists generally acknowledged the importance of Goethe's contribution to the idea of metamorphosis (Richards 2002, 478).

A subsequent and associated challenge to simple mechanism has been the discovery of the informational character of DNA—even if the mentalistic term “information” is treated as a metaphor for the self-reproducing patterns that define biological characteristics from the cellular to the ethological level (Artmann 2008). The reason why DNA may be embarrassing for mechanism is that its function is not determined simply by casual chemical reactions or the mechanical connections between its parts, but purely by the organized structure of the information encoded in it. On the contrary, as changes at the molecular level have direct consequences for the behavioral and adaptive level of the entire organism, and the transmission of the molecular structures depend on the fitness of the entire organism in its environment, the complexity of the entire structure is enhanced by this mutually causative arrangement (Wills 2016). The arrangement not only excludes mechanistic linearity, but also draws attention to the cooperation between molecular and phenotypical processes.

As opposed to randomness, the best explanatory concept for DNA structures seem to be their macrolevel meaningfulness:

In qualitative terms, biological information is perhaps best described as the ‘meaning’ of a sequence. A nucleotide sequence assumes meaning only when it is either transcribed into a RNA molecule that directly carries out a biological function, or transcribed into a mRNA that is then translated into a functional protein, or else the DNA itself interacts with proteins or RNA molecules resulting in a functional (often, regulatory) effect. [...]

However, the only general way to extract meaning from sequences involves comparative analysis of homologues. The premises are extremely simple, yet powerful. The great majority of the meaningful sites in nucleotide sequences, i.e. those sites that contribute to biological function, are subject to purifying selection, hence evolutionary conservation of meaningful sites. The stronger the selection, the more meaningful (‘important’) a site is. These simple considerations allow one to naturally quantify meaningful information contained in sequences. (Koonin 2016)

As our knowledge about the DNA and how it carries genetic information in its base pairs has advanced, Kantian appeals to *apparent* teleology continue to lose persuasiveness when compared to the Goethean notion of a directing “idea,” both essential and observable in the living forms.

Additionally, it is striking that objective forms of teleology have also re-emerged as a theme of physics as in the twentieth century. Examples of this recovered appreciation of teleological phenomena include the crystallization of snowflakes, the formation of tornados, and the end-directed action of so-called chaotic systems that can now be simulated to quite a high degree of accuracy. The exploration of these systems has led to many new publications such as *Chaos: Making a New Science*, by James Gleick, and *The Arrow of Time*, by Coveney and Highfield, the latter arguing for a recovery of end-directed action in physics.

Andrew Pinsent, for example, has concluded that,

Chaotic systems have usually been studied and even named from a perspective conditioned by Newtonian thinking: the trajectories of point-masses in an absolute space. From this perspective, their dominant characteristic is a rapid erosion of reliable prediction, the behaviour with which the term ‘chaos’ was originally associated. If, however, the study of these systems is considered in terms of changes to extended objects, with aspects that can be mapped to notions of matter and form, then an Aristotelian reading of these systems becomes apparent, and the need to acknowledge an irreducible final cause becomes clear. From this perspective, the remarkable property of the evolution of these systems towards a final state is not that they destroy order, but that they bring order out of chaos, or change one kind of order into another. (Pinsent 2013, 15)

In other words, despite the name, so-called “chaotic systems” are not merely systems for the destruction of order, but ones in which initial forms are broken down and generate a final form in the manner of an Aristotelian *telos*. Indeed, such systems like the “Lorenz butterfly,” which only have been studied in recent decades, can be thought of as Aristotelian engines transforming initial matter into final forms, like an Aristotelian *telos* (Pinsent 2013, 6–7).

On this account, rather than teleology being an illusion, the case is increasingly plausible that the *rejection* of teleology has been an illusion. This illusion has been generated by the restriction of physics, since Newton, to the small number of systems, namely, idealized two-body systems, that can be integrated analytically or treated approximately as collections of such systems.¹⁷ The picture gradually emerging today is that the kind of causation typically associated with machines is much less prevalent in complex systems than the kind of end-directed causation associated with living and growing beings.

At the beginning of the third millennium, we are, therefore, in a new and unexpected situation. Goethe’s insights have been given new

validation, not only in biology but also, increasingly, in all kinds of complex systems that are usually studied in physics. And since final causation is no longer obsolete or incompatible with a properly scientific outlook, we no longer need to follow Kant's lead by automatically dismissing final causation as a basis for objective aesthetic value.

CONCLUDING REMARKS

As a philosopher writing from Brazil, I cannot avoid remembering the exotic figure of our first world-famous actress, Carmen Miranda. Known by the peculiar fruit-hat she often wore on stage, the actress intentionally associated her own beauty, dance and music with teleology on many levels. In particular, her association of her own full feminine beauty, youth, and fertility to the analogous fruitfulness of plants showed that she, at least, did not follow Kant's lead in rejecting a role for teleology in aesthetics.

According to the classical concept of beauty, beauty is something like goodness perceptible to the senses, including intellectual senses, and goodness is defined as what contributes to the fully developed form of a thing, the achievement of its final cause. Natural examples include the beauty of a flower that unfolds through natural causes. Examples from art include the beauty of a great work drawn from the imagination of an artist. On this account, any objective discipline of aesthetics should have a principal focus on the notion of final causes, in other words, aesthetics is a discipline that is about teleology. Elements of this appreciation of teleology may be drawn from the appearance of a thing, such as the symmetry of a flower, or from the meaning of a flower given as a gift.¹⁸

Given that this definition appeals to final causation, there is clearly the potential for this entire approach to be undermined if doubt is cast on the validity of such causation as real and objective, as happened during the rise of early modern mechanism. A world without objective final causes, except possibly the designs of the human mind, is one in which aesthetics becomes a largely subjective discipline, as has indeed happened. This reduction was challenged by Goethe, who argued for a rehabilitation of the classical concept of beauty, but his message was accepted by comparatively few of his contemporaries.

As I have argued in this article, however, the main reason for dismissing final causes from metaphysics was the modernist belief that Newtonian physics made them impossible in nature. Comparatively recent developments in science, however, have in turn partially rehabilitated the notion of objective final causation over a vast range of phenomena from the freezing of snowflakes to the re-emergence of teleology in the role of biological organs to the study of so-called "chaotic systems" that evolve toward final states in physics.

Although disagreements may remain on the application of classical criteria for beauty, the gradual rehabilitation of final causation in contemporary science and metaphysics leads therefore to the following conclusion. Even if we choose to reject classical criteria, for some reason or another, we should no longer feel obliged to reject such criteria as a result of an appeal to science. As a consequence, judgments about the achievement of final forms can continue to have an objective bearing on what should be treated as beautiful.

Moreover, it should be added that objective final forms do not, of course, exclude the continuing validity of subjective judgments. A ripe apple, which is objectively good to eat, will often display a distinctive coloration that is appealing to the senses, and well-ordered things and often symmetrical things in general convey a sense of goodness that appeals to mind. Hence, instead of putting objective and subjective aesthetics into conflict, the recovery of objective teleology can also help to ground subjective judgments.

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NOTES

1. Of course, this somehow elevated and apparently romanticized view of beauty seems to make it otherworldly, and this is indeed Plato's view. Plato understood that the task of philosophy was to discern values, virtues, patterns, laws, and reasonability in general as stable and indestructible, since they are not constituted by parts. Intellectual properties were, therefore, accorded great value and were treated as being strongly related to one another, while physical objects shared the mutable and perishable nature of constituted beings. Contrary to many contemporary views of mental and intellectual realities as apparent and ontologically inferior to matter, Plato saw more sound reason in considering intellectual reality as the ultimate source of being and truth, while matter was only true and comprehensible while formed, that is, under the guidance of some idea or intellectual reality.

2. In the metaphor of the *Phaedrus*, for example, our souls have wings that grow stronger when the soul is fed wisdom and goodness, and wither when fed with evil [*Phdr.* 246e]. Because the highest intellectual goods are interconnected in the integrity and stability of the rational realm, beauty, good, and truth are ubiquitously co-present with wisdom, which is also among Plato's theological reasoning for convergence to a supreme and perfect source of reality. The moral and wise souls, then, will see the sign of the divine in beauty, for beauty is the strongest of the divine qualities that affect the senses. Made tender by beauty, the soul awakens to the love of truth and good much quicker. Corrupted souls, on the other hand, are equally quickly made insensitive to beauty [*Phdr.* 250b–251]. More technical parallels to this account of the ground of being in the *Parmenides* can be found today.

3. *De Veritate*, q.21, a.1, "In answer to the first, although being is said to be absolute, nonetheless the good adds to it a relatedness to the final causes," and to call a being good

means that it is “capable of perfecting another after the manner of an end (Ad primum igitur dicendum, quod cum ens dicatur absolute, bonum autem superaddat habitudinem causae finalis,” and “primo et principaliter dicitur bonum ens perfectivum alterius per modum finis).”

4. As is well-known, symmetry was an obsession for the ancients, a consequence of a more naïve and idealized match between mathematical perfection and reality. The stronger claim that reality should be perfectly symmetrical was challenged by the discovery of irrational numbers, which can be accommodated by the critical philosophy of Plato, but could not fit well in Pythagorism. I note that broken symmetries are influential in physics today, but these are still ultimately rooted in symmetries in nature.

5. The fact of having to choose well some such goods that may have some consequent evils is also, of course, part of the art of politics.

6. “Ad hoc igitur quod voluntas in aliquid tendat, non requiritur quod sit bonum in rei veritate, sed quod apprehendatur in ratione boni; et propter hoc Philosophus dicit, quod « finis est bonum, vel apparens bonum » (Consequently, for the will to incline toward something it is not necessary that it is truly good, but that it is apprehended under the aspect of the good. On this respect the philosopher says “the end is a good, or something that seems to be good”).”

7. We never fail, Aquinas argues, by being fully rational, but only by being partially rational in order to “justify” an excess or an unnatural appetite produced by misjudgment or miscalculation. Reason would be a perfect guide if we used it all along the way, but it may fail if we apply it partially and fragmentarily for “quick and dirty” answers to immediate demands, compulsions and other evils. In this sort of malfunction, reason may stress conclusions that do not follow except from a biased perspective.

8. Mark Jordan (1989) argues that beauty is a transcendental, and possibly the transcendental of the good. The assessment of beauty as a pseudo-transcendental comes from a seminar led by Eleonore Stump.

9. For Kant himself, teleology did not correspond to proper objective knowledge, being rather a hypothetical judgment about things (Kant 2003).

10. Indeed, Kant describes the constitution of biology and aesthetics, as teleological subjects, as a “bridge building” (*Brückenschlag*) (Kant 2003, 40 [KU BLIV]), in the sense that they do not lie on solid ground themselves but are supported by the end of the bridges in morality and knowledge.

11. One of the main reasons for Kant’s suspicion about teleology, as proved in the section *Critique of the faculty of teleological judgement*, is the recurrent use of monism to justify the connection between the mechanical world and the world of purposes and freedom. This second world, Kant believed, proved the independence of the soul from the material order, while monism (at the time identified with Spinozism) subordinated souls, freedom, and purpose to matter and determinism. Kant appeals, therefore, to the need to avoid monism in the process of building bridges. As usual, in order to avoid what he believed to be a monstrosity, namely materialism, he considered that he had no other path to take than that of separating persons and souls from nature.

12. The case of Ernst Mayr is interesting. While strongly opposing teleology, the great evolutionist accepted teleonomic language to describe a great deal of processes (Mayr 1974). More recent literature shows that it seems to be impossible to avoid questions such as “what are stomachs for?”, “what are teeth for?”, “what are hearts for?”. See Garson (2016) for an overview of the issue.

13. The great British architect Pugin initiated a movement of gothic revival inspired by the idea of “moral architecture” (Pugin 1841). According to him, features and structures should not only be cleverly calculated to maximize function and use of the buildings, these architectonic decisions should also be “honest,” without attempts to mask the structure with façades that add layers of a different nature. In other words, architecture should be more *natural* and, at the same time, more *purposeful*.

14. At the time, analytical meant “separate to understand,” and was associated with mathematics and the dissection of bodies. Moreover, and in consequence, scientific practice in general proceeded by dissection and study of parts, assuming tacitly that all such measurable phenomena were machine-like.

15. We see plants growing, and we see the intelligent reaction to the covering of one half of a tree, when the tree slowly contorts itself to capture more sunlight. We learn by experience,

not through theory, that rodents have big teeth to make holes and dig for roots, and we see that horses have long legs in order to run better.

16. We love horses and panthers because they show us how capable and free they are in the easy play of all their members, and we see tortoises and pigs as less beautiful because they lack the same easiness of movement and play. In other words, Goethe believed that beauty was a property of the beings, not of the eye, and that beings with greater capacities to exercise freedom, which could be described as more “spiritual” beings, would also tend to be more attractive. On this account, human bodies are the supreme expression of beauty, allowing “nature” to be clever, creative, and moral in a way animal bodies do not.

17. As argued by Roger Highfield and Peter Coveney in their book *The Arrow of Time*, self-organization does appear from seemingly chaotic contexts, revealing to us that much of modern physics has been based on forced abstractions about linearity drawn from two-body systems (Coveney and Highfield 1990).

18. One may have, for example, Cubist or Dadaist depictions of the apostle Peter, and they may serve as so powerful means of aesthetic understanding as renaissance or realist depictions that could, otherwise, be more conform to an expectation of precise reproduction of Peter’s appearance. In other words, aesthetics deals with symbolic meaning and not with descriptive meaning (Scruton 1987).

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