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ARENA OF TRANSDISCIPLINARITY

From Teleology to Psychology

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Abstract
In this article, I discuss the history of the idea of teleology in order to prepare a discussion of the status of teleology in the field of psychology. I start of by illustrating the inception of teleology in metaphysical debates and then move on to its disqualification in modern science. I then proceed to give an outline of a recent countermovement to the disqualification of teleology in scientific explanation. By the end of the article, an informed and nuanced foundation is achieved, and through this, one can fruitfully proceed to investigate the status of teleology in psychology.

Keywords Teleology · Causality · General psychology · Aristotle · Darwin · History of ideas · Philosophy of science

Introduction

In the following article, I pave the way for a discussion of the (more or less implicit) status of teleology in some of the broader theoretical traditions in the modern field of psychology—taking my departure in traditions constituted after the 1920s. Before I can fruitfully carry out such a discussion (in a part two article), it will be necessary to provide some historical background for the notion of teleology.

The methodological approach, I apply to constitute such a background is premised by two conditions. The first condition is that the two terms are so indicative of each other that one cannot get very far in understanding either one of the terms without the other. The second condition is that even given this first mentioned condition, there is a shortage of explications of the inner relation between core aspects of the ideas of teleology and theories from the field of psychology.

There is an enigmatic conundrum between the history of science and the history of ideas of science. This fact exists because Aristotle is usually praised as the archaic founder of the

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scientific worldview. Meanwhile, the defining tenets of his philosophical system have had a hard time throughout the history of modern science. That is to say, Aristotle's system for interrogating nature is premised on ideas of an inherent organismic teleology and ideas of essential properties of the psyche—more precisely the soul which is composed of particular energies. Such teleology and psychology are, according to Aristotle, what let the causal structure of the surroundings materialize.

However, teleology is, by and large, an extremely bastardized idea in modern science. Furthermore, psychology, the study of the psyche, has historically been one of the latest disciplines to be acknowledged at an institutional level (Danziger 1985, 1990).

In the following section, I briefly introduce Aristotle's notion of teleology and survey how it has earned its bad reputation through developments in modern science. I then proceed to level the scales by introducing a countermovement to the teleology hostility in biology. The ground has been laid at the end of this article to discuss the status of teleology in modern psychology.

Aristotle's Notion of Teleology[1]

In metaphysics, a debate has been carried out between the positions of the *external* and *internal* conceptions of teleology (Christiansen 2003).

Plato is often recognized as the first and most consistent philosopher of an external conception of teleology according to which, "the natural world is the product of a divine craftsman who looked to the world of eternal being for his model of the good and then created a natural order" (Žižek 2014, p. 9). Hence, according to the external conception, teleology is a term describing processes by reference to an agent which is external to the world and a value which is imposed on the object rather than a value inherent to the object. Aristotle is usually considered the prime advocate for the internal conception of internal teleology.

According to Aristotle's philosophy, the aim of a living process is apparent from the development of an organism and the values associated with the end state of the development: "the actualizations of the immanent potentials of an entity" (Ibid.).

Let us go a bit deeper into Aristotle's take on teleology by considering the following quote:

> The soul is the cause or source of the living body. The terms cause and source have many senses. But the soul is the cause of its body alike in all three senses, which we explicitly recognize. It is (a) the source of origin of movement, it is (b) the end, it is (c) the essence of the whole living body. (Aristotle 1970, II, 4)

How can the soul encompass all of these defining attributes (movement, goal orientation, and essentiality/evaluation) of the organism? Aristotle constructs such a soulful philosophy by letting the soul be defined as a patchwork of active and passive forces (Koutroufinis 2014, 2016).

As such, in his philosophical system, Aristotle distinguishes between *energeia* and *entelechia* (Chelsea 2015, p. 10–11; Koutroufinis 2016, p. 421). Energeia is the *act* of forming.

[1] The etymology of teleology is complicated. Woodfield (1976, p. 7–16) claims that two strands of Greek semantics were melted into modern Latin by the roman scholar Boëthius (ca. 480–526) and translated into English in the mid-eighteenth century. As such, the etymology would be from Greek télos ("purpose") and lógos ("word, speech, discourse"), into Latin *teleologia* (with an emphasis on telos meaning *end* rather than *purpose*) and finally into *teleology*.

The semantics of the term can be approximated as *is-at-workness* (Sachs 1995, p. 102). Entelechia—historically appropriated as the term entelechy—is the *form* of the final state at which we aim. The term entelechia is a contraction of *enteles*, meaning completed or full-grown, and *echein* derived from the term *hexis.* Entelechia refers to an entity having a specific mode of existence due to its active engagement in the enteles, that is, its own completion (Sachs 1995, p. 245).

These distinctions between active and passive forces are put to work in Aristotle's biology of the soul: processes that occur in an organism are all determined by the soul, that is, the *psyche*, the particular energia (ἐνέργεια) of the organism. The soul itself culminates in *eidos* (εἶδος). The eidos is the form of the species (i.e., the particular entelechia), that is, a form towards which the given organism unfolds, as it represents the ideal of its species (Aristotle 1970, II, 1).

This formal cause of an organism can also be understood as *life*, by which Aristotle understands the capacities of unprecedented growth and decay patterns, plus self-nourishment (Aristotle 1978, II, 4).

Hence, the eidos is a specific final state which an organism is growing and striving towards. While the organism's soul is underway to the eidos, it is governed by particular modes of growing and moving.

It is important to stress that, according to Aristotle, these tendencies to grow and move towards the strange attractor of eidos are inherently valuable and full of mental implications for the organism. This fact is important to stress for multiple reasons.

Firstly, it brings Aristotle's notion of teleology in contact with general psychological topics—such as the constitution of perception, motivation, and meaning. The fact that the human is (the becoming of) a form of life among other forms of life should not be theoretically neglected. Instead, it should serve to indicate a critical point of departure for any psychological theory as have been the guiding principle in the work of the Danish general psychologist Niels Engelsted (a program most recently summarized in Engelsted 2017).

Secondly, it corrects a tendency in much of the Anglo Saxon philosophy of biology to interpret Aristotle as a functionalist. As Jonas (1997, p. 163) states it: "[Aristotle's notion of] teleology is only in the second place a fact of structure or physical organization, as exemplified in the relation of organic parts to the whole and in the functional fitness of organism generally."

Thus, first of all, Aristotle's notion of teleology represents a worldview which "simply forbids considering a natural process controlled by blind, i.e., non-mental forces, as being able to achieve the kind of ordered result attained by an appropriately formed organic structure that serves the purpose of staying alive, like an organism or an organ, rather than degenerating into chaotic malformation" (Koutroufinis 2013, p. 5—interpretation of book II of Aristotle's *physics*).

The undeniable lecture of Aristotle's notion of teleology is that the processes which lead to ordered structures in nature provide clues to basic mental properties.[2] Thus, we must understand Aristotle's notion of teleology as a mental, immanent, and special conception of teleology, which specifies three workings of the soul: the soul is what animates movement, the soul is the end state of movement, and the soul is the evaluative essence of the organism.

[2] Processes which can be explained by recourse to blind mechanistic forces are described by the term *automaton* in Aristotle's philosophical system (Koutroufinis 2013 and 2014).

Let us coin these aspects *Mobility telos* (MT), *Finality telos* (FT), and *Essential telos* (ET), respectively.

The Bad Reputation of Teleology in Modern Science

> This decoupling [of natural selection] from specific substrates and mechanisms was the source of Darwin's most revolutionary insight: that adaptation in biology only becomes realized ex post facto. (Deacon 2012, p. 442)

It is well known that Darwin's theory of evolution offered a deadly punch to the idea of a purposeful development of life forms. However, to see exactly how this is the case, it is worthwhile to take a step back from Darwin and start with the debate between Jean Baptiste Lamarck (1744–1829) and Georges Cuvier (1769–1832).[3]

Lamarck and Curvier—Teleology with No Becoming of Essence

Lamarck insisted that it was the behavior of the organisms which provided the most important moment of evolution. When the climate or ecological niche around the organism changes, then demands to alter behavioral patterns likewise arise, and these behavioral alterations then again determined the structure of the organism. The alteration in behavior is thus, according to Lamarck, the force which drives forward the structural variations among species. Lamarck agreed with the majority of his contemporary scholars that the human being was placed at the pinnacle of the global developmental hierarchy among the species. However, he also held that the human being undergoes evolutionary processes, whereby they must adapt to their surroundings.

Simply put, the more evolution a species has gone through, the better adapted the individual organism will be.

Køppe (1993, p. 146) analyzes that this idea allows Lamarck to claim adaptive pressures while retaining an external teleology since it is claimed that the human is the perfect organism, but, the ultimate tendency of the adaptive pressures is to mold the species towards perfection.

Throughout nature, a divine plan of perfectibility shines with the human on top. To disagree with this principle in the eighteenth century would have been a sign of the utmost heresy.

Curvier was a harsh critique of Lamarck's theory, and his own teleological theory of evolution obtained very popular status at the beginning of the nineteenth century. Curvier is often credited as the first paleontologist because he suggested classification, which allowed a comparative approach to study the anatomy of organisms and relate this to fossils. The basis for Curvier's systematization rested on the assumption that the organs of an organism are suited for each other in a harmonious order. Every organ fulfills a specific function in the totality of the organism, and therefore, the organism must be conceived of as an integrated and teleological whole.

As such, in Curvier's theory, no organ can change without impacting every other organ and thereby the entire organism itself. Since gradualism has been an uncontested assumption in debates about evolution until the second half of the twentieth century,[4]

[3] The outline of this debate builds on Køppe (1993, p. 145–54).

[4] Most notably through the work of Stephen J. Gould (1941–2002), see especially Gould (2007).

such drastic changes seemed absurd to thinkers in Curvier's time. Therefore, he could claim to have driven back the dynamical and historical notion of species advocated by Lamarck. Hence, Curvier claimed to have proven that species are stable and static entities.

The upshot of this debate is that Curvier agrees with Lamarck when it comes to the righteousness of an external teleology; this fact simply was not up for debate at the time. But Curvier and Lamarck disagree on the character of this teleology and the existence of an internal teleology. That is, Lamarck smuggles in a grand master plan behind all the instabilities of adaptive pressures from geographical and climatic changes. At the same time, Curvier more axiomatically builds in an external teleology to evolution by hypostasizing it from the assumed internal teleology causing the harmony of the organs.

Furthermore, while both Lamarck's and Curvier's theory contain elements of MT (Lamarck behavior, Curvier organ movements) and FT (Lamarck perfectibility, Curvier organ and anatomy design) of Aristotle's notion of teleology, there is a particular discrepancy between the role of the essence in the Lamarck/Curvier debate and Aristotle's notion of teleology. For Aristotle, the essence of the organism is played out in the mixture of active and passive forces, which make the organism attain a structure that is its purpose.

However, in the Lamarck/Curvier debate, we see that the discourse of the development of the organism has changed to a debate pitting historical change against essential stasis, thus eclipsing the possibility of an essential becoming. Thus, Aristotle's specific reconciliation of flux and stasis into the organism becoming the form of the species is left unvisited at this stage of the development of evolutionary theory, even though the theoretical terrain still affirms the MT and FT aspects of teleology (as developed by Aristotle).

Darwin's theory of evolution is revolutionary, especially in this regard.

Darwin and the Disavowal of Teleology

The breakthrough in Darwin's thinking came from more thoroughly accepting (than Lamarck and Curvier) the almost infinite magnitude of natural variations. Given the overwhelming both intra- and inter-species variations, Darwin thought it was unproductive to define species as complete and harmonic unities. Instead of treating the natural variations as noise, Darwin made variation to the central unit of analysis for developing an account for the development of species. Evolution then, according to Darwin, occurs in an infinity of minute successive changes. These changes are so small that they are, in principle, indiscernible from the perspective of a single generation. But simply affirming the enormous magnitude of natural variations does not explain why groups of creatures have traits much more alike and why certain traits are much more prevalent than others. To explain the first phenomenon, Darwin relied on boundaries between closely related species to be caused by specifics of reproductive systems and to answer the second phenomenon. Darwin fostered the concept of *natural selection*. The concept is an application of the law of big numbers; across millions of years, those traits that have been most conducive for survival will be selectively retained since individuals carrying these traits will have a higher survival rate. In contrast, those not carrying the traits will die out.

The mechanisms of genetics (Mendelian inheritance) able to supply Darwin's theory with accounts of the genesis of natural variations and inheritance of traits are a much later development. But that is not our principal concern here.

The revolutionary[5] impulse of Darwin's theory is that it outlines evolution without any recourse purposes guiding developmental trajectories towards their final states. According to Darwin, adaptation is identical to survival rates. Hence, adaptation consists of nothing more than the expression of properties, which makes an organism more or less likely to survive in the environs of its species. Darwin thus made MT, FT, and ET aspects of teleology seem entirely redundant in the discourse of evolution.

This disavowal of teleology from biology gained considerable support throughout the twentieth century through academic developments such as the various versions of neo-Darwinian schools and cybernetic traditions. The most relevant factors when considering the status of teleology in psychology are the debates about how to describe the behavior of organisms without recourse to teleology. As an example of how the disavowal of teleology has run its victory laps in academia, it is illustrative to consider Ernst Mayr's (1904–2005) book called *Towards a New Philosophy of Biology: Observations of an Evolutionist* (1988).

Herein Mayr states (Mayr 1988, p. 3) that:

> There is neither a program nor a law that can explain and predict biological evolution in any teleological manner. Nor is there, since 1859, any need for a teleological explanation: The Darwinian mechanism of natural selection with its chance aspects and constraints is fully sufficient.

Thus, Mayr's stance is premised on his distinction between teleology and what he calls *teleonomy* and *teleomatics*.

Teleomatics describes the apparent goal-oriented functionality of servo or feedback systems, which can be explained by recourse to physical laws. Examples of teleomatics includes electronic amplifiers based on operational amplifiers (i.e., positive feedback, as one amplifier is turned up or down the other is likewise turned up or down in a corresponding ratio) or thermostats (i.e., negative feedback, the thermostat approximates a selected room-temperature by regulating machinery to drive the temperature towards the opposite direction than the temperature on which the surroundings develop towards).

Teleonomy refers to processes directed or controlled by an organism's DNA. Examples include growth processes, hydration, and thermoregulation. Teleonomy, thus, describes the apparent goal-oriented functionality of organisms.

Mayr takes great care to emphasize that it is unwarranted to conclude from teleonomic and teleomatic processes to "an existence of cosmic teleology" (ibid.) However, Mayr's stance is premised on more assumptions than his distinctions between teleonomy and teleomatics lets know. A very important assumption for Mayr is that the biological body is some sort of computer, where the DNA contains the programs which orient the behavior of the organism. Only this assumption, in conjunction with the discourse on taking teleology to be extrinsic (qua cosmic teleology), allows Mayr to draw the conclusion given above.

[5] When I repeatedly use the term revolutionary to describe Darwin's theory, I do not intend to sensationalize or dramatize it. That Darwin's disavowal of teleology was revolutionary and is a widely held opinion among scholars of evolutionary theory—take as an example Monod's position (stated throughout Monod 1973) that Darwin's theory counteracted almost all of the most important ideologies of the past and present, since they all contains some grain of teleology.

Mayr's distinctions allow him to ascribe end-directedness to animal behavior involved in searching for food, mating, and achieving specific geographical locations, without coining these processes teleological. "According to Aristotle, in contrast, organismic end-directedness is the result of mental factors for which achieving a certain end has an intrinsic value. Thus, from his point of view, achieving an endstate by blind deterministic factors has no value since, in his metaphysics, a mental factor is required to assess the value of something." (Koutroufinis 2013, p. 3). So here we see at full display the impact of the discursive leaps away from Aristotle performed in the early debates of evolution.

What is more, a perspective on teleology like that of Mayr is illustrative of tendencies in mainstream psychology. Hence, Mammen (1997) outlines two magnificent pictures of the human psyche in the mainstream psychological literature, one being an archaic evolutionary representation of the psyche (i.e., claims about human behavior resulting from this or that adaptation to our natural surroundings as hunter-gatherers) and the second one being a computerized cybernetic creature, chewing through data inputs from the surroundings by algorithmically growing associations. Thus, one can identify a great deal of inspiration in mainstream psychology from the pseudo approaches to teleology in biology.

In summary, the debate on evolution until Darwin was filled with teleological axioms, in a manner which eclipsed Aristotle's notion of the vital essence of the bodily functions to an idea of the essence as a static and pre-formation-based ideal.

Darwin's evolutionary theory was revolutionary in its full-blown neglect of recourse to teleological principles. This approach inspired the dogma that there was, in principle, no place for teleology in biology, and this seems to have had repercussions in mainstream psychology.

If I were to go on and debate the status of teleology in psychology after the above, it would probably seem like a very idle project. Therefore, in the section below, I will survey more recently developed counter-discourses to the anti- and/or pseudo-teleology stance in biology. This approach will avoid insinuating disqualifying those psychological theories, which do include either MT, FT, or ET aspects into their foundations.

The Project for a Renaissance of Teleology in Biology

Recently the bio-anthropologist Terrence W. Deacon (1950-) has inspired biological theories that affirm a role for teleology in biology. This inspiration can be clearly discerned from the studies of Spyridon Koutroufinis (1967-), who has outlined Deacon's work as the most recent development in a thousand-year-long struggle between teleology and mechanicism (cf. Koutroufinis 2012, 2013).

Koutroufinis outlines in his research a historical account of the development of biology (and also its ancestry in various philosophies) in which biology can be divided into two camps: one who sees the behavior of the organism as a purposeful and willed project, this is the camp encompassing teleological theories (e.g., Aristotle, Paracelsus, and Hans Driesch), and another stance which sees the behavior of the organism as effected by covert and deterministic mechanisms, this is the camp encompassing mechanistic theories (e.g., late William Harvey, Descartes, and Mayr).

When outlining the modern developments of biology into this two-camp scheme, Koutroufinis pays special attention to §65 of Kant's (2013) *Critique of Judgment* since it offers a philosophical turning point in the teleology/mechanistic debate.

Kant writes:

> [The Organism's] parts are reciprocally cause and effect of each other's form […] In such a product of nature every part not only exists by means of the other parts, but is thought to as existing for the sake of the others and the whole, that is, as an organic instrument […] a product of such a kind […] is an organized and self-organizing being.

Thus, Kant's idea of self-organization mediates between the teleological and the mechanistic stance since it makes the organism's perseverance simultaneously the cause and the effect of the organism's own functioning.[6] This way of thinking has had a significant influence on modern biology, where the idea of *self-organization* has become a household term.[7] *S*elf-organization refers to the spontaneous creation of order among otherwise unordered material. A system is called self-organizing if it can manifest a transition from a stable and predictable state to a less stable and less predictable state.

Those self-organizing processes which are most often likened to "organismic properties" are the so-called dissipative structures, where energetic input flow-through systems give rise to the organization of patterns (Prigogine and Stengers 1984 is a classic on this theme).

However, Koutroufinis takes note that Deacon's work poses a critique of the tendency to extrapolate from self-organizing systems to living systems. This critique is based on the empirical fact that dissipative structures are reliant on an external energy gradient being fed continuously into the system and also that such a system does nothing to maintain or re-establish its internal structure should the external energy gradient be compromised (see Deacon 2012, p. 283–307).

Deacon, therefore, proposes a refinement of the ideas of self-organization in his work. He distinguishes between three sorts of hierarchal and inclusive processes.

The first types of processes are those having a rectilinear energy dissipation, simply following the second law of thermodynamics—Deacon calls these processes as *homeodynamics*.

The second types are those processes that allow systems to avoid being undermined by energy dissipation momentarily— these are called *morphodynamics* and consist of multiple homeodynamic processes. Finally, the third types of processes are those that not only momentarily avoid undermining through energy dissipation but also tend to re-establish themselves when broken up. Deacon terms these last processes as *teleodynamic.* They consist of multiple morphodynamic processes, and their smallest unit of analysis is exemplified by the *autogen* entity[8] (Deacon 2012, p. 307–345).

This entity consists of both self-organizing and self-enclosing mechanisms, that is, "reciprocities between self-organizing molecular processes [which are] sufficient to explain both self-replication and evolvability" (Koutroufinis 2013, p. 19).

[6] It is important not to mistake this argument for a circular one since the point is that Kant inserts a dynamics between parts and hole where there previously was simply a black-box between cause and effect.

[7] Of course Kant's concept of self-organization refers to reciprocities in the casual structure of organisms, while modern bio-scientists use the concept to describe open systems operating far from thermodynamic equilibrium. Hence, Kant's concept of self-organization is much more generic than the systems-theoretical version.

[8] The most simple version of the autogen consists of the coupling of *autocatalysis* and *self-assembly,* which are two non-linear self-organizing processes.

Koutroufinis outlines that Deacon's work represents a historical breakthrough since his theory shows how *teleological dynamics can arise from the physical and chemical basis, instead of claiming that non-material causes drive the telos of the organism*.

What is more, Deacon's theory in no way violates Darwin's theory of evolution. By stating a testable hypothesis about the autogen, Deacon's theory actually has the potential for answering some of the generic questions which the Darwinian (and neo-Darwinian) accounts of evolution cannot, for example, how the first forms of life emerge (Deacon 2016). As such, Deacon's work offers a resurrection of Aristotle's program for teleology, astoundingly, without violating Darwin's theory!

However, one caveat is necessary to mention. Where Aristotle's outline of MT, FT, and ET conceives of substance and form as on even footing everywhere in nature, Deacon's theory seems to be a somewhat mutated Aristotelianism, since his system is constructed such, that specific (semiotic) form emerges out of substantial interactions.

Nonetheless, Deacon's theory scientifically legitimizes all qualitative aspects of Aristotle's notion of teleology.[9]

Deacon traces the MT aspect back to the re-constituting properties of the autogen; i.e., the substances involved in autocatalytic processes will tend to move towards each other again if broken apart, due to substance affinity. He traces the FT aspects to the way various material and energetic processes start to *matter* for each other, thus "conspiring" to realize some states by keeping other—energetically undermining—states at bay.

Furthermore, the theory likewise proposes a justification for the ET aspects, since the stacking of teleodynamic processes[10] can lead to a locus of the telos, that is, an ascending complexity of species from self-sustainability to self-referential properties, depending on the number of discrete non-linear processes which a specific life-form manifests (Deacon and Koutroufinis 2014).

One cannot avoid seeing the similarities between the above-outlined resurrection of (Aristotelian) teleology in biology and the above mentioned general psychology of Niels Engelsted which likewise proceeds via an Aristotelian perspective, envisioning the field of psychology as a continuum ranging from the simplest animal functions and on to complex human traits (Engelsted 2017). To mention just one example, Engelsted also treats the strive for nutrition—already manifest in the sentience of the most simple of organisms—as a sign of an immanent telos.

The above goes to show that the Aristotelian notion of teleology has endured an *Aufhebungen* (Hegel) process in which its negation in biology has been itself negated such that teleology has once more appeared at a higher epistemic level—as is seen in Deacon's refinement of the theme of self-organization without violating Darwinism. Such a renaissance of teleology can provide a biological legitimization for attaining teleological propositions in psychological theory.

Thus, when I proceed, in a later article, to discuss teleology in psychological theories, we will not do so with a bias towards disqualifying specific theories because of the axioms of anti- or pseudo-teleological biological theories.

[9] By providing empirical examples with testable consequences conceptually encompassing both MT, FT, and ET aspects (see immediately below)

[10] Importantly Deacon does not claim that the autogen system is in any way alive; it merely illustrates how *the minimal conditions of something being alive are co-constituted with the minimal conditions of semiosis*. Therefore, the autogen model does not purport to be mentally driven (it does not own an internal representation of its surroundings), but on the contrary, it represents *a model of the genesis of those self-constraining properties* which abound in living and mental systems (the basic components necessary to form an internal representation of the environs).

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Compliance with Ethical Standards

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Human and Animal Rights This article does not contain any studies with human participants or animals.

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