© Journal of Indian Council of Philosophical Research
July-Sept 2011, Vol. XXVIII, No. 3, 33-42

The Artificial, the Natural and the Necessary in Aristotle's *Physics II*

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Abstract

What explains the curious mixture of the natural and the teleological in Aristotle's *Physics II*? An answer, that this paper attempts to outline, lies in his conception of the relationships between the natural and the artificial. Focusing on these "natural-artificial linkages" will help us understand how unique Aristotle's naturalistic enquiries were: how he could locate causality in what exists, without solely relying on the necessities.

Aristotle occupies a unique position in the history of thought concerning the natural world. For him, conscious action does not govern this natural – sublunary – world; nor are necessities of material-nature constituting natural objects enough to account for the natural change. Both the traditions, of locating causality either in divine agency or in material necessity, were available to him, and he championed neither of these. Yet, even though he did not invoke any agency, his philosophy was still teleological; and though he was convinced that natural necessities of the matter cannot *completely* explain the existence and coming into being of natural objects, he was still a naturalist. What explains this curious mixture of the natural and the teleological? What is it that must have compelled a naturalistic thinker like Aristotle to reject non-teleological accounts explaining the 'good' in the living beings? What led him to perceive and locate the causality in nature in the way he did? Understanding the structure of Aristotle's thought on natural change is parasitical on understanding his thought on artificial change. The natural and the artificial are so woven, or rather entangled together in the discourses of Aristotle that unless these entanglements are revealed, and that too without breaking them, it is difficult to explain the teleological in Aristotle.

I

"Of things that exist, some exist by nature, some from other causes" (The main text I use in this paper is the translation of Aristotle's *Physics II* by Hardie and Gaye; this as well as all other translations are drawn from McKeon [1941] 2001, unless indicated otherwise. The quotes from *Physics II*, as per the standard practice, are followed by the page number, column letter and line number from the Bekker edition). Thus begins Aristotle's *Physics II*, with a distinction between what all is 'natural' and what is not. Arguably, this distinction is most crucial in understanding the *existence* as well as *change* in the natural world. In the questions – what constitutes Aristotle's natural world and natural objects, and why – are to be found the roots of his ideas of change in the natural world, and of what necessitates this change. Animals, plants, earth, fire, air, water exist because of natural cause, or the cause of their existence is 'natural', it is neither 'artificial' nor 'supernatural' (It is a little odd to use this word, especially given its contemporary connotations. What I mean here by the "supernatural" is simply that it has its origins not in *this* sublunary world). So, the natural products are not like the "products of art" that have no "innate impulse to change" (192b18). If the artificial has this "innate impulse" it is only to the extent that they are constituted by the natural; a bud may sprout like a plant, but not by virtue of its being a bed but by virtue of the wood that constitutes it.

The reason I have spent time on this wellknown Aristotelian distinction between the natural and the artificial is to bring home equally well understood, but often ignored, underlying division of the internal and the external: the *source* of production is "external to the thing" in artificial products and is internal to the natural ones. None of the artificial products has "in itself the source of its own production" (198b27). In natural productions the cause of change lies *within* the natural things "in virtue of what they are" (198b35). "What nature is, then, and the meaning of the terms 'by nature' and according to

nature, has been stated" (193a1) by Aristotle by *locating* the source (or cause) of existence and change or motion. If the source of not only change but existence itself is within the thing – and is within by virtue of what the thing is, essentially and not accidentally – that is the thing itself is the source of its own production, then Aristotle says that it exists 'by nature'. A house, a bed or a coat exists because of us human beings; the source of their production is not internal but is external to them. On the contrary, the cause of existence of an olive tree is internal, it is some olive tree itself: a seed coming from an olive tree naturally grows into an olive tree; "man is born from man, but not bed from bed" (193b9). Wood can potentially be a bed, but only when it is given, from without, the form or figure that makes a bed what it actually is.

Thus, Aristotle defines what is natural by contrasting it with what is artificial, and by locating the source or cause of motion, change, stability and existence – it is internal to the natural, but external to the artificial object. And, so he was a naturalist in the fullest sense of the term. Then what is it that compels him to be teleological? Why does the end enter into his discourse on natural change?

II

On one hand, contrast between natural objects and artificial objects helps us locate causality in nature; while on the other, contrast between natural objects and mathematical objects helps us understand why physicists or naturalists *have* to study both: form and matter of natural objects as well as the 'end' of natural processes by which they attain these.

Aristotle had the legacy of those who held the "theory of forms" (193b35) and also of those who were mainly "concerned with the matter" (194a19). But for Aristotle, neither of them, alone, could make for the study of being *qua* being. The physicist who studies beings as they actually exist, can neither abstract their form nor can define them in terms of matter alone. Hence, Aristotle's interest was clearly in (to borrow a phrase

from Feyerabend) the richness of being and not in the abstraction of form. "Objects of physics" are not the same as "objects of mathematics"; unlike "mathematical properties", "natural properties" are not separable from the being, from the "world of change": "snub nose" cannot just be a "curved thing" (193b35). A quote from *Metaphysics* (Trans. W. D. Ross [1941] 2001, 1025b30) will help us better understand Aristotle's concerns: "Of things defined, i. e. of 'whats', some are like 'snub', and some are like 'concave'. And these differ because 'snub' is bound up with matter (for what is snub is a concave *nose*), while concavity is independent of perceptible matter". Aristotle continues to tell us why the natural objects are to be studied as they exist. "If then all natural things are analogous to the snub in their nature – e. g. nose, eye, face, flesh, bone, and, in general, animal; leaf, root, bark, and in general, plant (for none of these can be defined without reference to movement – they always have matter), it is clear how we must seek and define the 'what' in the case of natural objects" (cf. Balme 1987, 306). For Aristotle universals are derived, not existing, entities: motion is studied by moving objects, health is what healthy person is, "justice exists insofar as some substances are just" (Barnes 1995, 82), and thus the natural scientist has to study snub *nose*, that is being *qua* being (for a detailed and comprehensive discussion see Barnes 1995, chapter 3). Just like a doctor has to have knowledge of both the health and bile, and a builder of both the form of a house and bricks, and if the art of doctoring and of building a house imitates nature, the physicist has to have knowledge of both the form and the matter – they are "the part of the same discipline" declares Aristotle (194a21). But then how is the 'end' also equally, if not more, important in the study of "world of change"?

"Again", says Aristotle, "'that for the sake of which', or the end, belongs to the same department of knowledge as the means" (194a26). Thus, not only form and matter, but also means and end, fall under the domain of physics: physicists study beings *qua* being, and how these beings come into being. "What grows *qua* growing grows from something into something" (198b16).

For example, man is born from man, and olive tree from olive tree. And, at least by the way of these examples, it should be clear what Aristotle might mean when he says "the nature is the end or that for the sake of which" (194a26), and the "end" is the last and best stage of anything undergoing a continuous change. To better understand this talk of the 'ends', and the 'means' that attain these 'ends', Aristotle's example from the world of art might be of help.

Aristotle distinguishes between the "art which uses the product" and the "art which directs the production of it" (194b1); that is, for instance, between art of helmsmen and of those who make it. Now, it should be as obvious to us as it seemingly is to Aristotle, that not just the art which "directs the production", but the "using art" too is "in a sense directive". "For the helmsman knows and prescribes what sort of form a helm should have, the other from what wood it should be made and by means of what operations" (194b5). And, as with the "products of art' so with the "products of nature" (for art imitates nature), the difference is that in the former "we make the material with a view to function", but in the latter "the matter is there all along".

This is how the 'end' or 'that for the sake of which' is directive in nature and in art. The physicist then studies what the nature – matter and form – of a natural object is, and how this nature is attained. That is, while studying how the nature of a particular natural object is attained, the physicist has to study both "that for the sake of which" and that which makes "what is made" or "what causes change in what is changed". For Aristotle, material-formal and efficient-final causality falls under the same roof of study.

III

Let us dwell a little on what insights can be drawn from Aristotle's views in the previous sections, what we have learned, and what more we can, from the artificial and the natural? First, matter and form are not separable in the objects belonging to the world of change – they are separable, if at all, only in thought. So, the study of nature of the natural objects is the

study of form *and* matter together. Likewise, it is the study of "ends" – "that for the sake of which" means operate. The products of arts imitate the products of nature in that they are not only directed but directive as well.

At this point we should talk of some important differences between the artificial and the natural, in view of Aristotle's causality. Though the 'end' is directive in both the cases, there are differences. The first major difference between the natural and the artificial is that, as we saw in section one, the source of change is internal to the natural object but external to the artificial object: "the father is the cause of the child" (194b30), but a sculptor, not the statue, is the cause of the statue. Here we must note that Aristotle did not get carried away by the analogy between natural objects and artificial objects: he did not postulate the presence of any divine agency, nor of any abstract world of the ideal forms. Cause of change in his sublunary world. belongs to this world, and is to be found here. This makes Aristotle a naturalist at its core.

The end (or rather, the "good end": "For not every stage that is last claims to be an end, but only that which is best" (194a31)) is directive in a sense that it necessitates the necessary matter and the change (Cooper 1987 is a well known classic discussion on necessity in Aristotle's theories). This necessity is not the same as the ***absolute*** necessity which makes, for instance, rainfall necessary: hot necessarily goes up and the cold necessarily comes down. But, Aristotle calls the necessity imposed by the end, in contrast to just mentioned simple or absolute necessity, as ***hypothetical*** necessity. So, coming back to the natural/artificial distinctions, in both the cases, the end hypothetically necessitates the suitable material (a wood-cutting saw necessitates iron or bronze). But attainment of the end is limited by the necessities of the matter involved, and more so in the case of natural objects because "the matter is there all along" (194b8) – in the case of natural objects we do not have the freedom to choose from iron or bronze. Aristotle is teleological for his conviction in the necessity imposed even by the natural ends, but this 'hypothetical' necessity works well within the constraints of 'material' necessity (I will return to this briefly in later section IV. My discussion of necessity is limited to bring out its connection to the natural and the artificial in Aristotle's causal scheme).

Aristotle's is not a language of cause and effect where cause is necessarily prior to the effect. Hence we do not always have to infer the prior cause from the latter effect. Hume told us how we are conditioned to infer *from* cause *to* effect so nicely that let me digress a bit and quote from his *Abstract of a treatise of Human Nature* (Hume 2000): "Suppose I see a ball moving in a straight line towards another, I immediately conclude, that they will shock, and the second will be in motion. This is the inference from cause to effect; and of this nature are all our reasoning in the conduct of life: on this is founded all our belief in history: and from hence is derived all philosophy, excepting only geometry and arithmetic." But, when Aristotle put forth the exhaustive list of causes, he had no hesitations to put 'end' as a cause. Since for him there is no strict "prior cause – posterior effect" relationship, the direction of causality can be teleological, that is it can be from the end to the beginning (The point is nicely brought about by Hankinson in his writings, see for example Hankinson 1995 pp. 129). This indeed is the case, for example, when man is begotten by man.

In Aristotle's causal scheme, in the case of natural objects, the formal, final and the efficient cause coincides because here "the 'what' and 'that for the sake of which' are one, while the primary source of motion is [also] the same" (198a25): man is the formal and the final cause, and the source of motion as well (for "father is the cause of the child").

IV

The way we generally take the natural/artificial distinction today is by categorizing the natural with the unintentional *and* necessary (say, necessary by initial conditions and scientific laws), while categorizing the artificial with the intentional and

with that which is not *naturally* necessary. Interestingly and importantly, this is not the way in which Aristotle takes the natural/artificial distinction. For him, broadly, there are events or "things that come to pass by necessity and always, or for the most part" (196b10), and there are things that are "for the sake of something" (196b16). And, the things that come for the sake of something can be a "result of thought or of nature" (196b23). Thus for Aristotle the things can come into being "for the sake of something", intentionally as well as naturally. There is no relationship between necessity – for example material necessity – and natural/artificial distinction. Things that are for the sake of something can be natural and still be "outside the necessary and the normal" (196b20). Aristotle does *not* equate the necessary with the natural. This might be one of the reasons why he calls the necessity effected by the end as the "hypothetical" necessity. At the beginning of chapter nine he says "As regards what is 'of necessity', we must ask whether the necessity is 'hypothetical', or 'simple' as well". (Much has been made out of Aristotle's distinction between "hypothetical", and "simple" or "absolute" necessity (for example, see part three of Gotthelf and Lennox 1987); in fact, natural teleology is taken, at least partly, as a consequence of irreducibility of the hypothetical necessity to the material necessity).

V

As is already mentioned in section III, things do happen due to necessity, says Aristotle. But then, they may not always serve some purpose, "the sky rains, not in order to make the corn grow, but of necessity" (198b18). Things may also happen due to chance or spontaneously. But then, they may not happen as regularly as rainfall does in winters. Now if we consider the development of parts of animals, it is neither due to the first case (of necessity) because they always serve some purpose, nor due to the second (by chance) as they develop with much more regularity than winter rainfalls. "Therefore action for an end is present in things, which come to be and are by nature" (199a6). Thus, what happens in nature is akin to what happens

in intelligent action; "as in intelligent action, so in nature; and as in nature, so it is in each action, if nothing interferes" (199a10).

Aristotle bears witness to the action for an end in natural and artificial change: antecedent necessities do contribute to the cause, but it is the end that effects the causes – causes that are internal to the natural beings but external to the artificial objects. Aristotle drew much of his understanding of the natural from the artificial, and he was still a naturalist: he located the causality in what *exists*.

ACKNOWLEDGEMENTS

Sincere thanks are due to Rakhi Banerjee, Jon Hodge, Ritesh Khunyakari, Tim Lewens, G Nagarjuna, and Stathis Psillos for their kind and critical reading of a draft of this paper. I am also grateful to the editor and an anonymous reviewer of the *Indian Philosophical Quarterly* for their helpful comments.

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