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# A-THEORY OR B-THEORY OF TIME?

## AN ARISTOTELIAN ANSWER

### **Preface**

The purpose of this paper is to provide an introduction to Aristotle's theory of time, in order to understand if it could introduce a stimulus into the contemporary debate on the nature of time between the A-theory, according to which there is only an absolute and objective present time, and the B-theory, according to which there is no absolute and objective present, because all times are equally real and metaphysically on a par. The first section (§1) of the paper is devoted to a conceptual explanation of these two main positions about the nature of time and their intimate link with the theses of Eternalism and Presentism. The second section (§2) presents the Aristotelian view on the nature of time. The third section (§3) tries to locate the Aristotelian theory in the contemporary debate, following two different strategies: initially, this paper suggests that Aristotle endorses a hybrid form of A-theory and B-theory, with a tacit preference for the former; secondly, it tries to locate his position in a specific debate on the nature of time concerning the problem of 'temporary intrinsics', explaining Brower's argument on Aristotle's endurantism. In the Conclusion, it will be analysed Brower's argument as strictly linked to Aristotle's notion of time.

### **§ 1 A-theory and B-theory of time**

Let us start the explanation identifying two main ontologies of time: Presentism and Eternalism. Presentism is the view that only the present is real; Eternalism is the view that past, present, and future are equally real<sup>1</sup>.

These ontologies find their metaphysical ground in the famous distinction between A-theory and B-theory of time, which traces back to J M E McTaggart's famous paper 'The Unreality of Time'

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<sup>1</sup> There exists also a theory named the Growing Block Theory, according to which only past and present are real. According to the following structure of the paper, it is useful to focus the attention only on Presentism and Eternalism.

(1908). McTaggart introduces a difference between A-series and B-series orderings of objects and events: on an A-series ordering, objects and events are ordered in terms of their being past, present and future; while on a B-series ordering, objects and events are ordered in terms of their relations of being earlier, later than, or simultaneous with other times and events.

Consider the two following sentences:

(a) ‘My sister is in Rome.’

(b) ‘My sister is in Rome in the year 2017.’

In these two sentences, it is possible to identify two different meanings of the copula ‘is’ (Ney, 2014: 147): on the one hand, considering (a), the ‘is’ is used in a tensed sense, where ‘is’ means ‘is now’; on the other hand, the ‘is’ in (b) is used in a tenseless sense, namely my sister ‘is’ just in case she is in Rome at some time or other.

Moreover, the tensed properties of objects and events – *A-properties* – are subject to *change*, whereas tenseless properties – *B-properties* – do not (Ney, 2014: 148). Following the example, it means that if my sister will return to Milan in 2018, sentence (a) will be false because the fact is not happening now, while (b) will remain true ‘eternally’, because the fact that my sister is, in a tenseless sense, in Rome in the year 2017 was true yesterday, is true now and will be true in the future.

According to this explanation, it is possible to identify two different theories: a B-theory is a theory which reduces *A-facts* (facts about the A-properties of objects and events) to *B-facts* (facts about the B-properties of objects and events), while an A-theory is a theory which reduces B-facts to A-facts (Ney, 2014: 148-149).

What is the relation between the two previous ontologies and those two metaphysical theories? Presentism is clearly an A-theory of time, while Eternalism is usually combined with the B-theory of time<sup>2</sup>. More specifically, Eternalists typically hold that objects and events are ordered as a B-

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<sup>2</sup> Some A-theorists do accept eternalism, but they are rare (the Moving Spotlight Theory).

<sup>3</sup> For a clear explanation of the link between temporal-periodical parts and the human act of divide and count, see

series (i.e. they stand in tenseless relationships) but not an A-series, and therefore there is no metaphysical distinction between the past, present, and future. Conversely, Presentists do not think that all events or objects are equally real because, according to the common sense view and to their use of tensed features, there is only the objective present time, while past events or objects no longer exist and future events or object do not yet. Following those two ontologies, the debate moves around a specific kind of controversy: are A-facts or B-facts metaphysically fundamental?

## § 2 Aristotle on time

As Strobach highlights (1998: 48) Aristotle characterises time, referred to an object or to an event, in two main ways, namely in terms of ‘periods’ (χρόνοι) and ‘instants’ (νῦν). So, in order to reach a clear understanding of his notion of time, it is useful to consider these two different dimensions, the ‘periodical dimension’ and the ‘instantaneous dimension’.

What do ‘period’ and ‘instant’ mean in Aristotelian terms? A ‘period’ in *Physics* VI and VIII is always a period of a certain duration that can be divided into different parts, referred to the pleasure of a ‘divider’<sup>3</sup>. At the same time, these parts are periods again. Although it seems that time consists in subperiods, Strobach (1998: 49) denies that Aristotle is a time-atomist, because those subperiods exist only through the act of a divider and not metaphysically speaking. This dimension is the ‘periodical dimension’<sup>4</sup>.

Considering this ‘potential infinitive divisibility’ of periods, it is possible to divide them without arriving at any instants. However, a period is made up by an initial instant and a final instant. What are those ‘instants’? They are periods’ limits (Aristotle, 1995: 220 a21–24). In his *Metaphysics* (1940: 1022 a3–5), Aristotle identifies four different meanings of the notion of *limit*, but the first and the fourth are strictly related to this meaning of ‘instant’. Firstly, “‘Limit’ means the last point of each thing, i.e. the first point beyond which it is not possible to find any part, and the first point

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<sup>3</sup> For a clear explanation of the link between temporal-periodical parts and the human act of divide and count, see Coope (2005) especially ch. 10.

<sup>4</sup> See White (2009: 271-274) for a deepening of the ‘periodical’ component.

within which every part is”. Secondly, it is “the reality or essence of each thing”. In other terms, what makes any interval the interval it is that it has some particular limits – a particular starting and final point. So, it is clear that, until the notion of limit is understood in those ways, it does not coincide with the thing that it delimits and, more important, that a thing is essentially that thing only thanks to its limit.

At this stage of the explanation, the notion of *limit* allows a better clarification of the fundamental feature of ‘instant’: since it is the boundary of what precedes and what follows an event, it cannot be divisible. As Aristotle (1995: 234 a6–15) claims, if it could be divisible, it would contain (temporal) parts, as a period does, and it will be made up by these parts. If it takes the form of a period, it could be divisible into past and future, while we have said that an instant works as the boundary between what precedes it and what follows it and it cannot be identified with the things (past and future) that it delimits. The *now* intended as indivisible is the ‘instantaneous’ component of time.

So, time possesses the ‘instantaneous’ and the ‘periodical’ dimensions. Although this may be a clear distinction, there is a question: what is the fundamentality-relation between periods and instants? Here is a persuasive answer: the notion of limit has two different meanings, because it works as the boundary of a thing but also as its *essence*. If an instant is the limit of a period, it is not only the boundary of a period in its passage through what precedes it and what follows it, but it is also its essence. So, it works as the metaphysical ground of the period, which is essentially a period thanks to its boundaries, which are instants.

### **§ 3.1 Aristotle’s present’s primacy**

Based on this brief explanation of Aristotle’s theory of time, it could be thought that he is endorsing a particular form of the B-theory of time: periods are defined by instants, that are their limits and that vary from context to context, depending on the act of a divider, without assuming a moment of time – *the present* – as objective and absolute. However, Aristotle surprisingly states:

Though time is identical everywhere simultaneously, it is not identical if taken twice successively; for the change it measures, likewise, is one when considered as present, but not one if considered as partly past and partly future. And time considered numerically is concrete, not abstract; whereby follows that it changes from the former to the latter ‘now,’ inasmuch as these ‘nows’ themselves are different. (*Phys.* 220b6–10)

In this passage it seems that Aristotle claims an explicit present’s primacy: ‘the present’, as identical everywhere simultaneously, is the fundamental temporal dimension and through the present is possible to recognise what is present differently from what is past and future. At this stage, Aristotle’s view can be understood as mostly similar to an A-theory of time in which there is an absolute present.

So, Aristotle thinks about  $\nu\nu\nu$  in those two very different ways. Metaphysically speaking, it is possible to talk about periods and instants only because there exists someone who is able to divide up a period and who recognises that a period has an instantaneous starting point and an instantaneous ending point. In that case, Aristotle is speaking about ‘instants’ as ‘potential dividers’ (1995: 222a 20), because through the act of a divider (Coope, 2005: 169-172) it is possible to point out instants as period’s limit.

However, according to Aristotle, it is possible to recognise another meaning of  $\nu\nu\nu$ , namely it is also the ‘actual uniter’ (1995: 222a 21), that Aristotle (1940: 233b 33) calls ‘the present’, through which it is possible to recognise what was and what will be (White, 2009: 274). As an ‘actual uniter’, the present works as the privileged dimension of time which holds the past and future together, as the previous quotation shows. In order to be ‘the present’ as intended by an A-theorist, an instant must possess two properties: it must be one and it must be objective. Aristotle is able to attribute both these properties to ‘the present’: as a matter of fact, he states that ‘it is really one and the same thing’ (1995: 234a 3-4), and at the same time it is not said in any derivative sense (1995: 233b 33-35) .

As mentioned in §1 above, the controversy between A-theorists and B-theorists moves around the fundamentality of A-facts or B-facts: Aristotle recognises both these facts, because A-facts are facts occurring at ‘the present’ while B-facts are facts depending on the distinction between ‘periods’ and ‘instants’. However, it is not always clear which kind of fundamentality-relations subsists between them.<sup>6</sup> I will try to suggest that according to the Aristotelian doctrine of actuality and potentiality, it would be possible to argue for the metaphysical priority of the ‘the present’ to ‘periods’ and ‘instants’ – or, in other words, the priority of A-facts over B-facts.

Aristotle (1940: 1047b 33-37) famously distinguishes between *potentiality* and *actuality*, where the former means the capability of an objects to become or not what, to do or not something that it is intimately related to its essence; while the latter means the actual realisation of only one of these capabilities. For example, it is possible to consider a seed of a plant as the ‘potentiality’ to be an actual plant and an actual plant as the realisation of seed’s potentiality. Otherwise, Aristotle (1940: 1050b6–1051a2) argues that to be capable of something implies the capability of contradictory potentialities (the seed *could* become a plant, but it is also possible that it will never become a plant), whereas actuality means the actual realisation of only one of these potentialities and it does not imply any contradictory state (a seed that it is *now* a plant is only a plant, and it is not a non-plant). In Aristotelian terms, what does not imply any contradictory states is metaphysically prior over what implies contradictory states, because the latter contains a kind of non-being that the former does not.

Analogously, it may be claimed that an ‘instant’ is what exists potentially only through the act of a divider, because ‘one will get an instant whenever one divides a period’ (Strobach, 1996: 49), but if an ‘instant’, considered as potentially existent, coincides with the instant that is actually existing, ‘the present’, as the actual uniter of past and future, it is ‘identical everywhere simultaneously’ and it cannot be absolutely considered as non-present (past or future). According to this explanation,

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<sup>6</sup> See Corish (1978) who claims that Aristotle orders events and objects through a before-after-now relation and White (2009).

‘the present’ (A-fact) is metaphysically prior to an ‘instant’ (B-fact), because, in some sense, it is its actual realisation and it is not dependent on the act of any divider.

### § 3.2 Aristotle’s endurantism

In order to understand Aristotle’s position in its A-theoretical form, the second part of the explanation will clarify this kind of relation by following Brower’s argument (2010: 894-902) on Aristotle’s Endurantism. It will be firstly presented the debate between Endurantists and Perdurantists, focusing the attention on the ‘problem of temporary intrinsics’. Secondly, Brower’s argument will be explained.

Given the debate between the A-theory and the B-theory, those two theories have to face to an important problem: how do objects change over time? Consider a cat, Polly, at two different times: she is sleeping lying down in the morning, and later in the afternoon she starts to run, standing up on her legs. It follows that Polly is both lying down and standing up. How is it possible that one and the same object has different incompatible shapes?

Consider the following situation:

(a) Polly at  $t_1$  is lying down, whereas Polly at  $t_2$  is straight.

(b) Polly at  $t_1$  = Polly at  $t_2$  = Polly

(c) Polly is both lying down and straight

Given *Leibniz’s Law* (for all  $x$ , for all  $y$ : if  $x = y$  then for all  $F$ ,  $x$  is  $F$  if and only if  $y$  is  $F$ ) Polly, one and the same object, possesses incompatible properties. How can Polly be the same if she possesses incompatible properties? This is the problem of ‘temporary intrinsics’. Philosophers have tried to answer this question in two main ways: 1) one and the same object is wholly present at different times – this position is called ‘Endurantism’; 2) one and the same object is partially present at different times, as it is a sum of temporal parts, each of which exists at only one time – this position



is called ‘Perdurantism’<sup>7</sup>. Simplifying, on the one hand an A-theorist should be more confident with Endurantism, because it is clear that if only the present exists then an object is wholly present at this time; on the other hand, a B-theorist should be more confident with Perdurantism, because it is possible to divide time into temporal parts only if it is considered as a block, where there is no difference between past, present and future. Both perdurantists and endurantists have to face two different problems. On the one hand, the Endurantist solution appears to deny that objects persist (Goswick: 368), due to the lack of the actual and real existence of the pastness and the futurness of an object; in other terms, in order for an object to persist from  $t_1$  to  $t_2$ , it must be the case that  $t_1$  and  $t_2$  both exist. On the other hand, perdurantism seems to do not allow for real change (Goswick: 369), because Polly’s  $t_1$ -temporal part always has the property of lying down, and Polly’s  $t_2$ -temporal part always has the property of not lying down. Could Aristotle provide a new argument which avoid these problems?

Let us consider Brower’s solution (2010: 892), that he calls the “constituent solution”. According to this approach, objects encountered by human beings in their experiences persist through intrinsic change by entering in different moments into larger wholes, of which they and their temporal parts are constituents. Considering Polly, an enduring object; she derivatively possesses lyingness and straightness, whereas Polly at  $t_1$  and Polly at  $t_2$ , as two distinct moments of her existence, possess these properties simpliciter.

Brower claims (2010: 894) that Aristotle’s hylomorphism<sup>8</sup> offers the best way to follow in order to ground this argument: according to this theory, ordinary objects are hylomorphic compounds which exist in virtue of a matter that possesses a certain kind of form, namely a complex organisational immanent property. So, Polly, a substance, exists just in case some matter possesses the substantial form of ‘felinity’: being a feline is essential to being Polly, so that if the matter out of which she is composed ceases to have the form feline, then she ceases to exist.

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<sup>7</sup> See Brower (2010: 886-890) for a discussion of these different positions.

<sup>8</sup> Ainsowrth (2016) offers an interesting deepening of Aristotle’s hylomorphism.

Following Aristotle, it is possible to distinguish between two different types of property possession (Brower, 2010: 896-7): (a) ‘constituency’ is the relation between a whole and one of its property parts, and (b) ‘inherence’ is the relation between distinct parts of a common whole. In his view, to be characterised by a property is to possess it as a constituent. Constituent relations made up two other different types of forms: Polly is a unified object that exist in virtue of some matter’s possessing a ‘substantial form’ (an essential property), whereas straight-Polly is an ‘accidental unities’, namely a unified objects that exist only by virtue of a substance’s (Polly) possessing an accidental form (straightness).

At this stage of the explanation, Brower (2010: 897) proposes his solution: “according to Aristotle, the familiar objects of experience undergo intrinsic change by successively entering into distinct accidental unities”. Following the example, it is possible to conclude that when Polly, one and the same substance, goes from being lying down to being straight, she changes only by successively entering into distinct hylomorphic compounds which themselves possess lyingness and straightness as constituents – compounds that we can refer to as ‘Polly at  $t_1$ ’ and ‘Polly at  $t_2$ ’ – without losing Polly’s substance who possesses these property derivatively.

Despite it could be a clear conclusion, Aristotle’s claims that to be characterised by a property is to possess it as a constituent. How does Polly possess some property as being-straight if she possesses it only derivatively? In order to understand this point, Brower recalls (2010: 898) Aristotle’s ‘accidental sameness’: for two distinct objects, as Polly and straight-Polly, they are numerically the same just if they share all of their matter in common at a time<sup>9</sup>. So, even if only straight-Polly and lying-Polly possess straightness and lyingness as constituents, when Polly share the same matter with one of these objects, she is characterised by those properties derivatively, without entering in any contradiction.

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<sup>9</sup> Differently from the constitution view (Sider, 2007), those two distinct things are numerically the same material object thanks to their sharing the same matter.

## **Conclusion**

To conclude, the paper would argue the perfect consistency between Aristotle's endurantism and the previous explanation of Aristotle's view of time. It is important to remember that Aristotle identifies 'the present' as the actual uniter dimension of time and 'instants' as potential dividers of time. Considering two different hylomorphic compounds of the same existing object: its possession of a constituent property at an instant and of a different constituent property at the successive instant is possible only if those instants are two different and successive instants dependent on 'the present'. Usually, temporal parts' theorists claim that an object is partially present at different times (Goswick: 372) but, in my opinion, it is hard to see how the same object persists if it is made up by different temporal parts. Aristotle's endurantism finds a way to solve this problem in a better way: differently from temporal parts' theorists, he is able to claim that an hylomorphic compound of an existing object, made up by a substantial and an accidental form, can be said wholly present now as substantially that object (Polly is wholly present as a feline) possessing some properties as accidents (Polly as straight), and wholly present now as the same substance but possessing some other properties (Polly as lying down). So, there are no two different objects that exist at different times, but there is only one and the same existing object that endures through different times.

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