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IS IBN SINA'S THEORY OF TIME COMPATIBLE WITH MCTAGGART'S B-SERIES?

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Abstract

Ibn Sina, indubitably one of the most essential philosophers of Islamic Philosophy, constructed a new account of time independently of Aristotle's system, despite the major Aristotelian impact on his time. Whilst doing this in his book *Kitab Al-Shifa*, Ibn Sina also gave a proof for the reality of time based on certain notions such as motion, speed, spatial magnitude, and the capacity he calls "*imkan*" which is a divisible magnitude, possessing before and after essentially; and how "time" is required in order for these notions to gain meaning. The question concerning the reality of time has attracted great attention from contemporary philosophers as well. J. Ellis McTaggart argued time to be an illusion in his highly controversial yet influential article "The Unreality of Time". In this article and in his book *The Nature of Existence* McTaggart claimed that time is unreal on the basis that our descriptions of time are either circular, contradictory or insufficient. McTaggart constructed his disproof on two different ways to cite positions or events in time; one being the "A-series", which identifies time as past, present and future moments, and the other being the "B-series", which basically identifies time as earlier and later moments. This study aims at answering the question whether the temporal system presented by Ibn Sina is compatible with McTaggart's B-theory of time or not.

Keywords: Ibn Sina, Time, Spatial magnitude, Imkan, Motion, McTaggart, B-series

İBN SİNA'NIN ZAMAN TEORİSİ MCTAGGART'IN B SERİSİ İLE UYUMLU MU?

Öz

İslam felsefesinin tartışmasız en önemli filozoflarından biri olan İbn Sina, dönemindeki yoğun Aristoteles etkisine karşılık, Aristoteles'in sisteminden bağımsız yeni bir zaman sistemi kurmuştur. *Şifa* isimli kitabında bu sistemi sunan İbn Sina, aynı zamanda hareket, hız, mekansal büyüklük gibi belli kavramların yanında bölünebilir bir büyüklük olan ve zorunlu bir şekilde öncelik ve sonralığa sahip olan bir kapasite olarak tanımladığı imkana dayalı bir zamanın gerçekliği savunusu yapmakla birlikte bu kavramların anlam kazanabilmesi için zaman kavramına ihtiyacımız olduğunu göstermiştir. Zamanın gerçekliği sorusu, güncel felsefenin aktörlerinden de büyük dikkat çekmiştir. Bu isimlerden biri olan J. Ellis McTaggart, hayli tartışmalı olmasının yanısıra etkili de olan "Zamanın Gerçekdışılığı" başlıklı makalesinde zamanın bir illüzyondan ibaret olduğunu tartışmıştır. McTaggart, gerek bu makalede gerekse *Varoluşun Doğası* isimli kitabında zamanın gerçek olmadığını ve zamana dair verdiğimiz her tanımın döngüsel, çelişkili veya yetersiz olduğunu savunmuştur. McTaggart, bu ispatını zamandaki anların veya olayların birbirine nispetle iki farklı şekilde sınıflandırılabileceği varsayımı üzerine kurgulamıştır. Buna göre A serisi, zamandaki anları veya olayları geçmiş, şu an ve gelecek şeklinde konumlandırırken B serisi, öncelik ve sonralık ilişkisi ile konumlandırmaktadır. Bu çalışma,

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İbn Sina'nın sunduğu zaman sisteminin McTaggart'ın B serisi ile uyumlu olup olmadığı sorusunu cevaplamayı amaçlamaktadır.

Anahtar kelimeler: İbn Sina, Zaman, Mekansal büyüklük, İmkan, Hareket, McTaggart, B serisi

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1. Introduction

Time has been an enigma to numerous philosophers throughout the history. One said he knows it very well when he is not asked about it but once he is asked he doesn't know it, one questioned its reality by questioning when we say time flows, time flows in what or what speed time has when it is flowing, and one considered these questions about physical time as pseudo questions since they cannot be verified one way or the other. The two philosophers who are the subject of this study, on the other hand, have opposing views on this question. Ibn Sina, who was especially interested in the inquiry into nature and had a tremendous impact on the sixteenth century developments[1], believes time is real and he gives a proof for this in *Kitab Al-Shifa*, whereas John McTaggart Ellis McTaggart claims time is unreal and gives a proof for this view in his work titled "The Unreality of Time".

In this paper my aim is to present the A-series and B-series employed by McTaggart in showing the unreality of time, followed by Ibn Sina's account of time and then showing the compatibility of this account with McTaggart's B-series. However, this paper does not aim at answering questions such as whether time is real or unreal, or whether McTaggart or Ibn Sina was right, or whether Ibn Sina's definition of time is overruled by McTaggart's criticisms against time; but rather whether Ibn Sina's definition of time is compatible with McTaggart's B-series of time as described in the aforementioned article. In order to do so, I will start by giving comparative definitions of A-series and B-series and then introduce Ibn Sina's understanding of time.

2. What are McTaggart's A-series and B-series?

In the article "The Unreality of Time" J. Ellis McTaggart denies the reality of time, as the title suggests, and while doing this he classifies the positions in time with respect to how they stand to one another. According to this classification, positions in time appear as they can be distinguished in two different ways. One of these is being earlier than some other moments or later than some[2], and the other is simply being either past, present or future. McTaggart calls the former B-series, and the latter A-series.[3] For the purposes of this study, my sole interest is on the B-series,

1 Ivor Leclerc, *The Nature of Physical Existence* (Lanham: University Press of America, 1986), 124-125.

2 I believe defining B-series as a relation between positions in time or their contents does not pose a problem according to McTaggart's definition of B-series. However, B-series can also be considered as a temporal relation rather than a relation between moments. For an example of such consideration, see Engin Erdem, "Zaman ve Kip", *Felsefe Tartışmaları 44* (2010): 50-51.

3 J. Ellis McTaggart, "The Unreality of Time", *Mind* 17/68 (October 1908): 458.

however in order to give a detailed account of the B-series it should be examined together with the A-series.

To put in spatial terms, since every moment in time has a location of its own on the time line, each and every one of these moments will have a unique position; hence create a B-series. This is due to the fact that each moment will be either earlier than or later than some other moment. If we assume time to be finite for the sake of the argument, there would be at least one moment later than the first moment, and there would be at least one moment that is earlier than the final moment; showing that both cases suffice to constitute a B-series. So if it is not the case that we experience a single moment forever –which would be a rather difficult position to defend-, then the formation of B-series by any two moments is inevitable.

McTaggart depicts this relation involved in the construction of the B-series as a "transitive asymmetrical relation". The constitution of the B-series, he claims, requires a transitive asymmetrical relation and a set of terms on which this aforementioned relation is defined. In a sense the objects of B-series can be asserted to be objectively existing instants in time.[4] This set of terms are outlined in a way that any two members picked out of this set are such that either the first is in this relation to the second or the second is in this relation to the first. For this reason, the relation taken to be fundamental in their ordering is not significant. Since both relations are transitive and asymmetrical, whichever we take the relation holds. And for any two terms picked from the set, either the first is earlier than the second or it is later than the second.[5]

Since B-series stands for the distinction of earlier and later[6], B-series exhibits a permanent relation, whereas A-series doesn't[7]. If an event –which is defined as contents of a position in time[8]- or a moment –which is defined as a position in time[9]- P is ever earlier than an event or a moment Q, it always is; or if a moment P is ever later than a moment Q, then it always is.[10] These relations of "being earlier than" and "being later than", which are represented by B-series, are thus permanent, meaning they hold to eternity without any change; for any two moments picked randomly, neither can change their ordering in time.

As opposed to the B-series, A-series doesn't present a permanent relation. Considering that McTaggart takes the A-series to indicate being past, present or future, he accepts every event in time as being once a future event. As time passes, a future event becomes an event in the nearer future, and eventually a present event. After it is present it moves to the past, and always remains past; becoming

4 Peter Øhrstrøm – Per F. V. Hasle, *Temporal Logic: From Ancient Ideas to Artificial Intelligence* (Dordrecht: Kluwer Academic Publishers, 1995), 216.

5 J. Ellis McTaggart, *The Nature of Existence Volume 2* (Cambridge: Cambridge University Press, 1927), Chapter 33, 9-12.

6 McTaggart, "The Unreality of Time", 459.

7 Ibid, 458.

8 Ibid.

9 Ibid.

10 Ibid, 459.

further and further past, time after time.[11] According to this, it can be claimed that the way in which A-series distinguishes events in time is by the tense they are conjugated or they belong to, whereas B-series orders the same events in accordance with their ordering in timeline. So at every moment, all events in time change their position in A-series, hence their A-series characteristics[12], but these events never change their positions in B-series.[13] That is the reason why A-series isn't permanent.[14] My writing this sentence was once future, now it is present, and very soon it will be past. Nonetheless, my writing this sentence is later than my birth, and thousands of years from now it still will be later than my birth.

In conjunction with this, the difference between A-series and B-series can also be demonstrated with reference to their temporal dating style. On this perspective A-series characteristic of a certain moment is assigned by a floating point of origin, whereas B-series addresses to the fixed dating. Thus, since terms such as yesterday, tomorrow or today originate from a floating point they change every day, depending on what "now" is; they are neither fixed nor temporally stable. As opposed to these pseudo-dates, B-series establishes a temporally stable dating procedure.[15] It is inconsequential where one stands to decide whether a certain date is earlier or later than another.

The non-permanent or everchanging nature of the A-series is not restricted only in an event's being once future, then it's being present, and then past; after an event is past, it continues changing as well. Assume there is a certain event K such that it is in the future, then present. And after that moment passes, the event K is in the past. However, as time passes every moment this event K becomes more and more past, moving to further past forever.[16] That is to say, as the present moves[17] from past to future, not only the future gets closer and become present and eventually past, but also the past becomes more past; making the idea of change captured by the A-series an ongoing process.

In order to give a rigorous comparative evaluation of these two accounts, McTaggart gives the example of Don Quixote. In the fictional adventures of Don Quixote, his battle with the windmills is earlier than the adventure of galley-slaves, thusly the adventure of galley-slaves is later than the battle with the windmills; and will always remain so. However, it is not clear whether these take place in

11 Ibid, 460.

12 Rod Girle, *Modal Logics and Philosophy* (Montreal: McGill-Queen's University Press, 2000), 137.

13 D. Hugh Mellor. "Thank Goodness That's Over", *The New Theory of Time*, ed. L. Nathan Oaklander – Quentin Smith. (New Haven: Yale University Press, 1994), 293.

14 Considered from a broader perspective, every property an event has other than its A-series characteristics can be said to be permanent. A movement's speed, the importance it has at the moment, etc. are always so, and will remain to be so forever. Jan Faye, "Introduction". *Perspectives on Time*. ed. Jan Faye – Uwe Scheffler – Max Urchs. 1-58. (Dordrecht: Springer Science+Business Media, 1997), 15.

15 Nicholas Rescher – Alasdair Urquhart, *Temporal Logic* (Wien: Springer-Verlag, 1971), 30.

16 McTaggart, *The Nature of Existence,* 13.

17 C. D. Broad, *An Examination of McTaggart's Philosophy Volume 2* (Cambridge: Cambridge University Press, 1938), 278.

past, present or future. Hence, while this plot constitutes a B-series, there is no A-series involved.[18]

In addition to these, McTaggart takes temporality as essential in the constitution of the B-series. The emergence of the B-series depends on time, since it can only exist as temporal. This is by virtue of the fact that the earlier later and later than relations involved in the constitution of B-series are time-determinations.[19] In addition to this McTaggart regards B-series in the construction of time[20]; revealing a two way relationship between time and the B-series. So it is the B-series, hence the earlier-later calculus of time[21] that is essential to give time.[22]

3. Ibn Sina's account of time

Although Ibn Sina shares common conceptions with Aristotle about time –such as its reality or its connection with motion-[23], he introduced an original theory of time that is neither a mere repetition of what Aristotle nor what Aristotelian commentators offered.[24] Ibn Sina starts his investigation of time by questioning an example of the motions of two mobiles. The reason he starts by questioning motion should be traced in the relation he settles between motion and time. Before his inquiry into time he established that the motion and time are not the same. This dissimilarity is due to two basic facts; firstly although motion can be fast or slow, time cannot. Secondly, when it is possible to talk about two motions happening simultaneously, the same cannot be said for time. Because the times of two simultaneous motions are one and the same; they do not differ. Since simultaneity

18 McTaggart, "The Unreality of Time", 465.

19 Ibid, 461.

20 Ibid, 458.

21 Arthur N. Prior, *Past, Present and Future* (Oxford: Clarendon Press, 1967), vi.

22 McTaggart's argument is not of great significance for the purposes of this study. However, for the readers interested, the argument can be briefly summarized as follows: McTaggart claims that change is essential to the essence of time, and in a universe in which nothing ever changed would be a timeless universe. However, since B-series is permanent, change cannot be explained in terms of B-series; meaning that B-series would be insufficient to explain change, hence insufficient to explain time. As opposed to this, in A-series there is constant change. So, B-series on its own cannot suffice to give time, it is incomplete; in order to give time A-series and the notion of change that comes with it are required. Nevertheless, the A-series initiate another set of problems. Each member of the A-series that can ever be classified as past, present or future is one of these at some point in time, but other at another moment. This means that each event must have all these properties of being past, present and future. So any event that is either past, present or future now, should also be past, present and future at the same moment. Since these three characteristics are incompatible with each other, A-series leads to contradiction. And at every step we take to avoid this contradiction we describe a tense in terms of another tense which leads to circularity. However, the tense that is employed for the clarification of the original tense is itself contradictory, and eventually the contradiction remains unsolved. Thus, B-series alone is not adequate in defining time, because change is of the essence of time and B cannot explain change. But A-series is contradictory although it provides change for time. From this McTaggart concludes that where there is no A-series, there cannot be time.

23 Jon McGinnis, *Time and Time Again: A Study of Aristotle and Ibn Sina's Temporal Theories* (Philadelphia: The University of Pennsylvania, PhD Dissertation, 1999), 315-316.

24 Ibid, 177-198.

simply indicates these motions' happening at the very same time; there are no two simultaneous times for two simultaneous motions, but rather only one time.[25]

3.1. How motion and time are connected

After establishing that motion and time are not the same Ibn Sina shows how motion and time are closely connected to each other. Ibn Sina not only considers motion as the cause of time's existence[26], but he also lists time along with the mobile, the mover, that respect to which, a point of origin and the destination as the six factors upon which motion depends.[27] Going back to the example of two mobiles, suppose there are two mobiles, such that they start and terminate their motion together. At the end of their motion, one has traversed a greater spatial magnitude than the other. Since motion depends on the above-mentioned six items, this difference in the traversed spatial magnitudes must have risen by at least one of them.

Ibn Sina addresses to these mobiles' fastness or slowness, or a dissimilarity in the number or length of the intervallic rests taken as the reason for unequal spatial magnitudes. This is because even if these two mobiles are assumed to move at the same speed –in order to eliminate the fastness or slowness factor as the cause for the dissimilarity in the distance traversed-, it is still possible for them to traverse unequal spatial magnitudes at the same time, given one takes a longer intervallic rests in total. Or again, even if they move at the same speed as they take relatively uneven intervallic rests, it is possible for them to traverse equal spatial magnitudes in different courses of time. These two cases, where the mobiles move at the exact same speed, reveal that equality in speed does not promise an equality in spatial magnitude.[28]

On the other hand, it is also possible for two mobiles to begin their motion together and traverse equal spatial magnitudes; however when one has terminated its motion at the target destination the other may not have yet reached there. So, even though they have started their motion together, they haven't terminated their motion at the same ending point together. To Ibn Sina, this again is due to same reasons with the first instance described above. However, as the examples suggest, since neither the speed nor the rests alone suffice to explain the difference in these motions, it is clear that the answer should be sought elsewhere.

3.2. The capacity as time

From these findings concerning motion and rest, Ibn Sina concludes that from the beginning of every motion until the end, there is a capacity –or as he calls it *"imkan"*- of traversing the spatial magnitude that very mobile traverses through that very motion. As the factors responsible for the varying results in the examples

[25] Avicenna, *The Physics of the Healing*, tr. Jon McGinnis, (Provo-Utah: Brigham Young University Press, 2009), 225.
[26] Ibid, 341.
[27] Ibid, 118.
[28] Ibid, 229.

given above were said to be speed or the rest, this capacity is determinate in the speed of the mobile or in rest. All in all, this capacity is the very factor allowing the possibility of traversing a greater distance by travelling faster than the current speed the mobile travels or by less intervallic rests; or contrariwise the possibility of traversing a lesser distance by moving slower or taking more intervallic rests.[29]

Since this capacity is determinate in the fastness or slowness of the mobile, it should be considered throughout that motion, within the boundaries outlined by the starting and ending point of the motion. According to this, within these boundaries between the starting and ending point, this capacity suggests a proportionality between the speed and the spatial magnitude. To illustrate, assume there are two mobiles traversing the same distance, such that one moves two times faster than the other and both travel without any intervallic rests. If we compare the "capacities" these motions have, the capacity of the fast mobile's motion would be half of the capacity the slow mobile's motion has. This is because, as it has been established before, the capacity should be in proportion to the motion; hence to the speed and to the spatial magnitude. And since the spatial magnitudes covered by both mobiles are equal, the speed would be the only criterion to differ the capacity. Thus, it is clear that the fast mobile's capacity should be smaller than the capacity of the slow mobile, which is two times the fast mobile's capacity.[30]

Besides, suppose there is a single mobile, traversing a certain distance at a certain speed. Now, if we rather take the midpoint of this distance as the new end point of motion, whilst keeping the speed unchanged, the capacity belonging to the motion from the starting point to the new end point and the capacity belonging to the motion from the new end point to the original end point would be equal.

As an illustration, suppose there is a mobile travelling from the starting point K to the end point M, and the midpoint between K and M is L. The original motion was depicted with the route KLM, with a constant speed and no rests. Evidently this motion would have a certain capacity. After changing the ending point, now there exists two motions; one with the route KL and one travelling through LM. Consequently, now there exists two capacities, one belonging to each one of them. Since both the speeds and the distances covered are the same[31] in these two motions, the capacity belonging to these motions must be equal. Furthermore, they are not only equal to each other, but they are also half of the capacity belonging to the original motion. This is due to the role of the capacity in question, which is paralleling the distance to the speed. So granted that the speed is kept unchanged, while the original capacity would allow the mobile to traverse from K to M, half of that capacity would allow a trip from K to L, or from L to M.

29 Ibid.

30 Ibid, 230.

31 Here what we mean by these distances' being same is their lengths being equal to each other. Clearly these are not exact same routes; KL is never the same with LM. But they agree in size, and recall that is what our capacity is concerned with.

The fact that the original capacity can be parted into two reveals that this capacity is something divisible. Thus it is set that this capacity can be divided in proportion to the distance covered. And since everything that is divisible either is a magnitude or has a magnitude, this capacity can never be deprived of a magnitude.[32] Additionally, it has already been settled that this capacity was determinate in the speed and the spatial magnitude, paralleling these magnitudes and as we shall see numbering the motion. Therefore, it allows a measurement which also necessitates being or having a magnitude.[33]

Ibn Sina considers 4 possible candidates as to the whatness of this magnitude. First, he questions whether this magnitude can be the magnitude of distance. However, as Ibn Sina has already demonstrated in one of the previous examples, although two mobiles traverse the exact same spatial magnitudes, these motions of two mobiles can vary in the capacity in question. Thus, it cannot be the magnitude of distance. Secondly he considers the magnitude of the mobile, which is also incorrect. If the magnitude in question were the magnitude of the mobile, this magnitude would be decided according to the size of the mobile. Hence, as the mobile were larger in size, this magnitude would be larger accordingly. However, this is not true. Next, he takes the motion itself as the third option into consideration. This also is not true. Because each motion is the same in terms of being a motion, thus no motion differs from another in this respect. This is why the change in this specific magnitude cannot be explained by a nonvarying criterion, since it is set that this magnitude differs from motion to motion. Finally Ibn Sina suggests speed to be this magnitude, however this also cannot be the case as has been shown already. Two mobiles which travel at the same speed can differ in this magnitude, or two mobiles that agree in this magnitude can vary with respect to their speed.[34]

Moreover, since this capacity ceases together with the end of the motion, it is not something that subsists in itself; it depends on the subject and the subject's motion. Also, because this magnitude differs, it is not of a fixed nature, its existence in the subject cannot be by means of a fixed disposition, but rather of an unfixed disposition.

All in all, there exists a capacity that is a magnitude of an unfixed disposition, that parallels the motion with speed and distance, that is a possibility pertaining to the motion within the limits of earlier and later, which is certainly not the mobile, the motion, the speed, the distance, or the size. And this is what we name time.[35]

As stated above time is what measures motion and time itself is a divisible magnitude, and this is the reason why motion too is divisible in this proportionality. So it is corollary that motion can be divided into earlier and later parts, as can the spatial magnitude. However, the main difference between these

32 Ibid.
33 Ibid.
34 Ibid, 230-231.
35 Ibid, 231.

two divisions is while the earlier and later parts of spatial magnitude can exist together, the earlier and later parts of a motion cannot.[36] To illustrate recall the example of the motion through route KLM. It is perfectly attainable that the earlier part of this route, namely KL, can exist together with the later part of the route, i.e. LM. And accordingly, if a driver decides to take the later part LM first the earlier part KL next, she can carry out this task of switching these earlier and later parts, since these spatial magnitudes exist together.

In contrast, the same task cannot be projected to motion. If there is a mobile travelling through the same route, then the motions involved in this trip i.e. the motion through KL and the motion through LM can never exist together; whilst one is happening the other is not.[37] So, whichever motion comes into existence earlier that is the earlier part of the motion, and it can neither switch its place with the later part nor can coexist with the later part of the motion. Furthermore, Ibn Sina asserts elsewhere that it is permissible to have more than one "now", and if there are two nows, then one of them is nonexistent. Therefore two nows cannot exist together.[38] In the same manner the earlier part of motion and the later part cannot exist together. From this it follows that there is a property such that it belongs to being earlier or being later in motion. And this property does not depend on distance, since, as has been noted, divisibility into the earlier and later parts is not an essential concomitant of distance, but rather of motion. In the light of this fact, it can be asserted that this property is a magnitude dependent on motion, and not on distance.

Thus, since the ordering in motion, hence motion decides or numbers which part is earlier and which part is later, it can be asserted that some number in motion behaves as the scale through these parts. This number belongs to motion as well as the beforeness and afterness, and it parallels the spatial magnitude traversed through the motion. Because, considering the fact that the spatial magnitude traversed can be distinguished into earlier and later parts, the motion could be distinguished in the same manner. Thus, time is this very thing doing this numbering. Therefore, time is the magnitude in the motion or more specifically the number of motion, serving to parallel the spatial magnitude in accordance with motion. This way it is not time differentiating the motion, but rather it is differentiated with respect to distance.[39] This is particularly essential to Ibn Sina's system, because if it were time which divided motion, then the definition could not escape the problem of circularity. And this is the very reason why Ibn Sina started his investigation with the example of motion through a certain spatial magnitude and continued with the motion through the half of that magnitude. Therefore, it is not time, but distance with respect to what motion is accorded with.

36 Ibid, 232.
37 Ibid.
38 Ibid, 221.
39 Ibid, 232.

3.3 Time's beforeness and afterness

It has been established the earlier and later cannot exist together in time. However, it is not accidental that time possesses these properties of being earlier and later; but it is rather essential, Ibn Sina claims. And things other than time, which also may have earlier and later parts that cannot exist together, are so by virtue of time.[40] Nevertheless, although the earlier part of time is essentially before the later part, this division in other things is not essential. The earlier and later in other things depend solely on which fraction of time they exist together with. Wherefore, the part that happens together with the before is labeled as before and the part that happens together with the after as after. And the before corresponds to what has happened and is over, and the after is what is not simultaneous with or what does not exist together with the before.[41]

Ibn Sina offers the following arguments for time's possessing beforeness and afterness essentially. Firstly, everything that can be said to be before and after is subject to change.[42] And every change, whether it is a motion or something's coming into existence or acquiring a certain quality that it didn't have beforehand, requires an interval. This is because change is simply the transition of an object that has a certain potency to the corresponding actuality. So, change, which is a passage, does not happen all at once, but only gradually.[43] From this it follows that any kind of change must happen in time. To illustrate suppose there is an object a, such that a lacks the property P at time t_1. And after a certain period, say at t_2 the object a obtains the property P. According to the definition given above, the interval between these t_1 and t_2, during which change happens, is what we call time.[44]

On this account, if time were to be treated as one of these things, time would be before and after by virtue of some other factor. Hence, if time didn't possess these states of being earlier and later essentially, time would have to be open to change. Now, if time were subject to change and since change happens gradually, then time would have to go through change in time or within an interval of time, which is not only absurd but also circular. Therefore, time possesses beforeness and afterness essentially, and clearly not by virtue of something else.[45]

On the contrary, suppose it is possible for us to find something on which time's beforeness and afterness depended; then time wouldn't be before and after essentially; but it would be before and after by virtue of some other thing. If there were such a thing on which time's beforeness and afterness depended, the next question would be whether that thing were essentially before and after or not. If that thing is not before and after essentially, then we would have to continue asking on what that thing's beforeness and afterness depended. If that other thing

40 Ibid, 232-233.
41 Ibid, 233.
42 Ibid.
43 Ibid, 108.
44 Ibid, 233.
45 Ibid.

on which this thing's beforeness and afterness depended is not so essentially either, then we would have to ask on what it relies. If this regress never ceases, then there is no answer to this question.

If, on the other hand, the regress ends at some point, then this final station, by virtue of which everything is before and after, must be before and after essentially. This is because if it is not before and after essentially, then it wouldn't be where the regress ends in the first place; hence it is before and after essentially. Ibn Sina maintains that this final point, where the regress ends, had to be time itself. This is so because, as it has been shown, the capacity, which is a divisible magnitude, which is an interval –within the starting point of change and the ending point of change- in which change occurs, which is essentially before and after, is time. Therefore, the regress ends at time, and consequently time is not before and after by virtue of or as a result of its relation to something else, but instead time possesses beforeness and afterness essentially. Hence, the possibility of changes occurs primarily in time and they occur in everything else on account of time.[46]

It has been established that time is divisible; more precisely time itself is divisible into before and after. And since beforeness and afterness is in time essentially, these qualities are inseparable from it; and because everything that can be said to be before and after is so as a result of their relation to time they are inseparable from these things as well.[47]

Although it has been determined that beforeness and afterness are in things by these things' relation to time, it has not yet been clarified how beforeness and afterness manifest themselves in things. To illustrate this manifestation, assume there are two objects[48], x and y, which are things other than time. When we say that x is before y, we postulate a relationship between these two objects such that there is a moment when x existed and y didn't yet. Nevertheless, as this temporal relation is declared, it is not clear where to detect it. Since x and y are located in time in a certain relation to each other, we should be able to find beforeness or afterness in them.

Ibn Sina has stated that anything that is before is what corresponds with before, and after is what does not exist with before.[49] Correspondingly, in this case, the object y did not exist with the object x, hence y is after x. However, before is what does not exist together with after or does not exist anymore; and after can only exist with the cessation of before. So, before and after cannot exist simultaneously. But, rather, "something that was before ceases inasmuch as it was before because something that is after inasmuch as it is after comes to be."[50] Thus, by definition, it follows that the part which is before y corresponds with the nonexistence of y, and the part after x corresponds with the nonexistence of x. From this Ibn Sina

46 Ibid.

47 Ibid.

48 These two things do not have to be objects in order for this beforeness-afterness relation to hold; they can be motions, people, events as well.

49 Ibid, 233.

50 Ibid, 236.

concludes that if we look for these before and after factors in *x* or *y*, or objects in general, we would be searching beforeness and afterness in nonexistence; and this is an absurd step to take, since no form of existence can be found in nonexistence. This is why this relation is not in objects, but rather it is either in time or a result of the connection with time.[51]

If this thing is time itself, then it is consistent with what Ibn Sina initially claimed time to be. If, on the other hand, it is a result of the thing's relation to time, then again it is consistent according to Ibn Sina. This is due to the fact that everything's beforeness and afterness is by virtue of time, hence this relation comes down to time and what time delivers. Since it is impossible for anything to be before and after, if time weren't before and after; the substratum of this beforeness and afterness would have to be time. Therefore, time essentially possesses before and after.[52] Ibn Sina further questions "how would there be time, and not a before after?"[53] From this it can be claimed that time not only possesses before and after essentially, but it also necessarily provides beforeness and afterness to everything else. Thusly time forces beforeness and afterness to everything that is subject to time, this way being before or after is a necessary consequence of relation to time, therefore time.

4. Are They Compatible?

After presenting the accounts of McTaggart and Ibn Sina, the main question of this study can finally be answered. I believe the answer to this question is affirmative, i.e. Ibn Sina's system is compatible with McTaggart's B-series and I suggest two main points as the basis for this answer.

First of all, McTaggart claimed that time is never observed except as forming both A and B-series.[54] The reason for this relation between the two series is A-series's, in a sense, requiring B-series. If examined closely, it can be observed that in each and every one of the A-series characteristics there is either implicitly or explicitly a reference to now.[55] As a result of this view we should be able to define the A-series characteristics with reference to the "earlier-later than" relation employed in the formation of the B-series. According to this, the present can be defined as the now that is been experienced or the moment that is simultaneous with now; the past can be defined as what is earlier than the present or now, and the future is the now that is yet to come, or what is later than the present in time. In addition to this, according to McTaggart the only time that we perceive directly is the present; the past and the future, on the other hand, is merely a product of inference with the aid of earlier-later than relation.[56] So, when the "earlier-later than" relation involved in the B-series is applied to "now", the product is the A-series. Therefore,

51 Ibid, 234-235.
52 Ibid, 235.
53 Ibid, 235-236.
54 McTaggart, "The Unreality of Time", 458.
55 Rescher–Urquhart, *Temporal Logic*, 27.
56 McTaggart, op. cit., 458.

if time is always observed as forming A-series as well as B-series, and if A-series is presupposed by B-series[57], then, the B-series is of great significance in our construction of time. Moreover, even though the B-series is considered as insufficient to define time by McTaggart, without an earlier-later than relation constituting an A-series would be tricky as well.

On the other hand, the earlier-later than relation in Ibn Sina's account of time –which has been referred to as beforeness and afterness in this study- has tremendous significance as well. On this account, time is not only before and after; but it is essentially before and after, which means a scenario where there is time but there is no before and after is not possible. Hence, everything that can ever be before or after, is before or after on account of time. In addition to this, Ibn Sina defines the true nature of earlier and later as being a state of time.[58] According to this definition, the true nature of the B-series characteristics is being modes of time. This implies that the role of time is not restricted to dictating beforeness and afterness to other things, but time is required for beforeness and afterness, since the substratum of beforeness and afterness is time itself[59]. Therefore, where there is no time, there is no beforeness and afterness.

Another resemblance between these two views is that they agree that change is necessary to time. They both claim that where there is no change there is no time. This idea manifests itself in McTaggart's philosophy through his view that if nothing changed there would be no time[60], and in Ibn Sina's philosophy through his exclusion of the unchanging from time[61] together with the idea that where there is no variation or no change, time cannot exist.[62]

However, while McTaggart claims that the idea of change cannot be captured by earlier-later than relationship, Ibn Sina believes this is possible as his system is constructed by the earlier-later than relation. Moreover, Ibn Sina thinks any kind of change or motion or coming into being requires a beforeness and afterness. This is because his definition of time depends on the interval between the before and after where the change occurs. As opposed to this, McTaggart claims earlier-later than relationship fails to capture change. Nevertheless, what is permanent hence unchangeable in B-series is the ordering of the moments or events, meaning that of two events as P and Q, if one is earlier or later than the other it always is. However, if we can talk about these events –which are changes in themselves-, then there is change and this change can be placed in B-series since we can say P is earlier or later than Q. From this it can be concluded that what McTaggart has shown to be permanent is not the world as he claims what B-series would indicate to be, but only the ordering of two moments or two asynchronous events. And only because the ordering of two events or moments cannot change doesn't necessarily imply

57 Rescher–Urquhart, op. cit., 182.
58 Avicenna, op. cit., 227.
59 Ibid, 235.
60 McTaggart, *The Nature of Existence*, 11.
61 Avicenna, op. cit., 144.
62 Ibid, 236.

that there is no change. So it follows that where McTaggart and Ibn Sina seem to differ from each other is not a genuine disagreement, since they take the different senses of change into consideration. Although they both take change as necessary for time, the change that is considered untenable via B-series by McTaggart does not correspond to what Ibn Sina calls change[63]. Therefore, their ideas on the relation between change and time can be accepted as similar, on a narrowed sense of change.

5. Conclusion

The temporal system depicted by Ibn Sina presupposes an interval for any kind of change, and this interval is defined by a beginning point and its termination. Time is defined as the divisible capacity through which the change occurs, between the before and the after. And by this very definition time possesses beforeness and afterness essentially. McTaggart's B-series on the other hand, is defined by the earlier and later than relationship between the moments or the contents of moments. In the light of the accounts given, aside from the fact that why they are presented, it is obvious that beforeness and afterness is essential to both systems. This fact reveals that the system Ibn Sina constructed in order to present his understanding of the temporal, seems to be on the same line with McTaggarts' B series.

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[63] This is mainly due to the fact that what McTaggart and Ibn Sina considers as change are different notions. McTaggart's B-series exclude A-series; hence a certain ordering can be done either in terms of A-series or B-series. According to McTaggart the idea of change can only be grasped by A-series, since B-series constitute a permanent relation. Therefore, to McTaggart, B-series are not capable of establishing change. Even though Ibn Sina too takes change to be essential for the existence of time, he believes time can be presented by an earlier-later relation. This is the reason why, while being compatible with B-series, Ibn Sina's theory does not exclude A-series. In the light of this, the conclusion arrived, i.e. what Ibn Sina takes as change is not regarded as change by McTaggart, or why they disagree on time's being defined in terms of B-series seems perfectly reasonable.

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