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# Heterochronic rhythm in Iranian-Arabian-Turkish Music

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## Introduction

The debate on the difference between the rhythmic system of Western music and the types of music known as "oriental" (originated in the Near and Middle East) has been going on for a long time. Iranian authors have long followed the Western metric principles to explain the rhythmic features of Iranian classical music. Theoretical writings often remain silent about the rhythmic system of Iranian music and implicitly take for granted the use of the European conception of "measure" in understanding meter in Iranian music. However, a careful investigation of rhythm in this type of music reveals that, while it has distanced itself from the old system, we may still ascribe the features of current Iranian music to that system, which is still alive in Arabian, Turkish and Tajik music.

What are these features and how can we explain them? The most important and common distinction between the rhythms of oriental and Western music was provided by Curt Sachs, who, a few decades ago, proposed the notions of "divisive" and "additive" to describe the rhythmic system of occidental and oriental (Near and Middle Eastern) music, respectively. These notions are used even by those theorists who have devised new and more appropriate approaches to explicate the differences between the rhythmic systems of these two musical cultures. Drawing on the more recent theories of rhythm which initially appeared in French ethnomusicological literature and are based on the notions of "isochronicity," "bichronicity" and "heterochronicity," in general, I would like to show that Sachs's approach and his two concepts of "divisive" and "additive," while not thoroughly far from some realities of the rhythmic systems of these two types of music, are problematic and not completely meaningful and that we had better replace them with the more accurate and clear notions mentioned above. Also, I intend to demonstrate that Iranian music still possesses a rhythmic system which could be called "bichronic" or even "trichronic" and that, thus, this music still retains its ties with the theories of rhythm proposed in old books and treatises on music.

## 1. Sachs and his "Divisive" and "Additive" Rhythms

Curt Sachs, in *Rhythm and Tempo* (Sachs 1953: 24-26, 90-95), has pointed out a distinction between the rhythmic system of the West and that of the Near and Middle East which has been frequently repeated and seems to have been almost always accepted by other musicologists. He gives a few short examples by European composers (Beethoven, Schubert, Bach and Brahms) whose rhythms could be understood both in terms of Western metric system and Greek metric system (as dactylic, adonic or anapestic) and concludes that, in spite of the possibility of such a dual viewpoint, these approaches are fundamentally different (ibid.: 23-24). Like other researchers associated with the comparative musicology of the early 20th century looking for natural origins of musical phenomena, Sachs believes that the rhythmic principles of Western music are often related to human "striding" while those of oriental music are associated with "breathing." He writes,

> The 'striding' form of rhythm can be called 'divisive.' A stride, in the words of Webster's *International*, is "an act of locomotion [. . .] completed when the [. . .] feet regain the initial relative position." The stride is hence a concept that exists before we divide it into two components or phases of *equal length* [emphasis added, S.F.], the step of the left foot and the step of the right. In a similar way, its musical counterpart, the 2/4, exists as a basic pattern before we divide it into one accented and one less accented step or beat, as we usually call it for the conductor's motion. (ibid.: 24,)

Then, describing oriental rhythms, which he considers as having dissimilar elements and calls them "additive" (ibid.: 25) he adds,

> These aggregates of dissimilar elements cannot be called 'striding.' Their physiological equivalent is rather the tension and relaxation that we experience in breathing in and out—a motion to and from which is under normal conditions regular but *hardly equal*. (ibid. emphasis added)

Now, let us see how he defines and differentiates these two approaches towards rhythm one of which is an equivalent of a "striding" and the other of "breathing in and out."

Sachs has tried to clarify his position on these two types of rhythm in various parts of the book, perhaps writing less about Western "divisive" rhythms—as if they are easier to understand and need less explanation—and more about oriental "additive" ones. He argues,

> The typical Western rhythm, as we understand it, is multiplicative or divisive: a 4/4 measure can be, and actually is, divided into two halves, four quarters, eight eighths, and so on: a 6/8 is twice 3/8, and a 9/8 is three times 3/8 with the principle stress on the first. And this is true even if there is a rest or the remainder of a tied-over note where the accent of the divisional caesura [(e.g. the first beat of the measure)] should be. (ibid.: 90-91)

In most cases when Sachs speaks of Western or "divisive" rhythms, it is to further clarify the features of their opposite types of rhythm, namely, oriental ones. Even at this point, where he talks about Western rhythms, he immediately points out,

> Most oriental patterns—unless influenced by the West—are indivisible and hence non-divisive. An oriental pattern could have 4/4 or 8/8 [. . .]. But eight would not be a multiple of fours or twos. It appears, on the contrary, as a sum of three and three and two, or, by connecting the last two members, of three and five. It is 3 + (3+2). (ibid.: 91)

And somewhere else, before the above quotation, again he describes divisive rhythms in the following way:

> Along with divisive rhythm [. . .] iambs, dactyls, and anapests [Greek metric patterns, based on different arrangements of syllable lengths: iamb= s (short) l (long); dactyl= l s s and anapest = s s l)]—show a different concept of rhythm. The regular occurrence on which such patterns rest is not a certain duration to be divided into *equal parts*, but rather a grouping (in poetry: foot) composed of longer and shorter elements (in poetry: syllables) such as 2+1, 3+3+2 units, or any other arrangement of shorts and longs. These rhythms are 'additive.' As a consequence, disturbing offbeats, ties, and rests in accented places are inadmissible in principle. They would destroy the identity of an additive pattern. (ibid.: 25, emphasis added)

He then concludes: "Divisive rhythm shows how the parts are meant to be disposed. It is regulative. Additive rhythm shows how the parts are actually disposed. It is configurative" (ibid.).

But what can we make of these definitions? It seems that, for Sachs, what makes the foundation of differentiation between these two types of rhythm in the first place is the fact of the inequality of the components of additive rhythms compared to the equality of the components of divisive rhythms. In other words, Sachs contends that we can divide the larger rhythmical units of European rhythms into smaller equal units, but this is not possible with the larger units of oriental rhythms (known as *dowr-e iqā'I* or rhythmic cycle). See the above quotation where he says, "The regular occurrence on which such patterns rest is not a certain duration to be divided into equal parts". This interpretation could be seen in his equating divisive rhythms with human striding, involving two equal steps (i.e., the movements of the right and left feet), and equating additive rhythms with human breathing, involving two unequal parts (of breathing in and breathing out. See his emphasis on the equality or inequality of the parts in the first two quotations). A 3/4 bar can be divided into three equal 1/4 beats and a 6/8 bar can be divided into two equal 3/8 beats. However, the reality of a 5/4 rhythmic cycle of oriental music shows that it cannot be divided into five equal 1/4 beats, but that we would need to consider it as the result of adding a 3/4 beat and a 2/4 one. Likewise, an 8/8 rhythmic cycle of this music is not achieved by multiplying a 1/8 beat by 8, but by adding a 2/4 beat and two 3/4 ones.

Sachs's idea about Western or divisive rhythms does not seem problematic, but the question is why he does not take a so-called "oriental" unit of rhythm, a rhythmic cycle—say, a 5/4 cycle—to be divisible into equal parts, that is, five equal beats, while as we will see, all old books and treatises on oriental music have admitted of such divisibility and have determined the time value of each rhythmic

cycle by using small equal (e.g., 16-beat) units. In view of the above quotations, it seems that there are three important factors involved in Sachs's above statements.

### *1.1 Accent (Stress)*

Clearly, Sachs never locates the accents in larger Western rhythmic units (i.e., bars or measures) in a way that would lead to unequal divisions. For instance, within a 3/4 bar, the accent is on the first beat, that is, the rhythm will be divided as 1–1–1, (in which the underlined beat is stressed), but not on the first and second beats, which could form the bar as a combination of two unequal parts: 1+2. Similarly, in a 9/8 measure, the primary accent falls on the first eighth-note and the secondary accent on the fourth and seventh eighth-notes, shaping the bar into a balanced division of 123-456-789, not, for example, an imbalanced form of 1234-567-89 (if the primary accent falls on the first and the secondary accents on the fifth and eighth eighth-notes), which would form the bar as 4+3+2.

In oriental rhythms, on the contrary, accents are placed in a way that leads to the formation of unequal or imbalanced divisions within larger rhythmic units (i.e., *dowrs* [or rhythmic cycles]). Sachs clearly writes,

> Additive rhythm has of necessity two aspects; it is metric as well as accentual. It relies on a clear distinction between the two members of which a pattern consists, be they of one, two, three, four, or five time units, and it needs accent in order to keep the two numbers apart. (ibid.: 93)

Thus, clearly, for Sachs, each rhythmic cycle (pattern) consists of two unequal members arranged together in a determined order and identifying the length of each unit (3 and 2, 4 and 3, or 5 and 2) requires accent. In fact, it is the location of accents that makes for grouping the beats of a cycle together, as, for instance, an 8-beat cycle is formed as 3+3+2. For this reason, dividing such a pattern or rhythmic cycle into eight equal beats would be against its true nature.

### *1.2 Configuration*

In the above quotation, the metrical aspect of additive rhythms should be understood in terms of Sachs's own definition of "metric." For Sachs, the metric aspect of a rhythm is related to quantitative differences of duration (i.e., being long or short) while a rhythm's accentual aspect depends on the members' qualitative differences which are defined by the presence or absence of accent. (ibid.: 26-28). Thus, once more, Sachs, in this quotation, has emphasized the inequality of the units of this type of rhythm by referring to the metric nature of additive rhythms.

The claim that this type of rhythm is metric is complemented with another statement which is intended to show that the larger units or patterns (i.e., the rhythmic cycles) of oriental rhythms not only make use of elements in them with various durations but also predetermine the arrangement and location of these elements in the rhythms. As reported above, in Sachs's opinion, additive rhythms are "configurative" and its parts have already been unchangeably disposed. In

truth, an additive rhythm is a formula which is exactly repeated and realized so that any disturbance to it, such as adding offbeats, syncopation and the like, would destroy its identity: "disturbing offbeats, ties, and rests in accented places are inadmissible in principle. They would destroy the identity of an additive pattern" (ibid.: 25). In divisive rhythms, however, "even if there is a rest or the remainder of a tied-over note where the accent of the divisional caesura should be" (see above), namely, in syncopations and similar cases, the place of the accent would not be changed because the accent and its place would be potentially there and would not necessarily realize in a formulaic way. Once again the divisibility of an additive rhythm into equal units is rejected, but this time by referring to the strict and unchangeable nature of its configuration.

### *1.3 Different levels of beat divisions*

We would not be able to have a true understanding of Sachs's view about the indivisibility of oriental rhythms without paying attention to the issue of various levels of rhythmic division. Although he has never directly claimed this, we would have to consider the issue of divisibility or indivisibility of rhythm in his theory only at the level immediately below that of the larger units (measure or cycle). In additive (hence, indivisible) rhythms, due to the location of the accents, which makes for formulas and configurations, this level, which is immediately below the pattern or rhythmic cycle, does not have equal parts (3+2+3, or 1+2, etc.). However, if we further divide the rhythm at a lower level, that is, at the level of the smaller units that are independent of accent and configuration, we would no doubt be able to divide into equal units all those additive types of rhythm which Sachs takes to be indivisible. For instance, a 5/4 bar would be divided into two unequal parts of 3+2 at the first level, but it would also be divided into five equal parts of 1+1+1+1+1 at the lower level. Similarly, an 8/8 bar could be divided into 3+3+2 at the first level, but 1+1+1+1+1+1+1+1, at the second. Divisive rhythms, however, can be divided into equal parts at all levels. A 4/4, for example, can be divided into 4 quarter-notes at the first level and 8 eighth- notes at the second. And a 9/8 can be divided into three dotted quarter-notes (three times 3/9, in Sachs's words) and into nine eighth-notes at the second.

It is also worth noting that we could by no means deny the existence of the second layer in oriental rhythms or take, for instance, the 2- or 3-beat parts of this type of rhythm as its indivisible units. All theoretical writings on Iranian-Arabian-Turkish music since Fārābi have not only admitted of *edrağ* or gradation[1] (comparable to French *monnayage*) or dividing these parts into lesser units (see, for example, Fārābi 1996/1375: 498; 2004/1383: 34)[*1] but also have all started with the shortest perceptible duration, namely, Greek *chronos protos*, to explicate the principles of rhythm (see Sawa 1382: 69).

[1] Seemingly the meaning of *edrağ* in the scholastic school is the opposite of its meaning in the school of Montazemiye.

[*1] [Throughout the text, wherever two dates appear in the parenthetical citations or list of references, the right number denotes the Islamic solar Higri calendar year. A.M.]

Now we can understand why Sachs does not consider oriental rhythms divisive and characterizes them as additive. In fact, for him, Western rhythms are divisible into equal parts at the level just below the bar, whose existence is determined by potential accents (whether or not realized) on these equal beats. Oriental rhythms are not divisible into equal units at the level just below the cycle—whose existence is established by determined configurations resulting from inequidistant accents, although these rhythms are divisible at lower levels.

## Reflections on Sachs's View

The first point regarding Sachs's approach and his way of explaining the distinction between these two types of rhythm is that even Sachs himself does not appear to be completely certain about what we take to be the foundation of his distinction, namely, the equality or inequality of the parts of these types of rhythm; a concept which, as we have shown, has been frequently repeated in most of his definition of these kinds of rhythm. At least at one point, he reveals this uncertainty when he writes, "this [issue] explains the almost total absence of divisive and, more so, of equally divided, 'striding' rhythms in the Near and Middle East" (Sachs 1953: 92). This proves that for Sachs, equally divided rhythms—whose absence in the Near and Middle East is more noticeable ("more so")—are only one type of divisive rhythm, a point that may inject uncertainty into his whole theory. Actually, if we remove the condition of divisibility of parts from Sachs's theory, nothing could prevent us from considering oriental rhythms as divisive, even at the first level immediately below the rhythmic cycle by dividing them into unequal 2- and 3-beat parts and the like.

Another point in the above quotation and the previous ones is that Sachs does not consider all oriental rhythms as indivisible. Here he refers to the "*almost* total absence" of divisive rhythms in oriental music and somewhere else (ibid.: 91) he clarifies that "*most* oriental patterns—unless influenced by the West—are indivisible and hence non divisive" (emphasis added). Of course, nowhere does he make clear as to which oriental rhythms have been influenced by the West and which ones make the absence of divisive rhythms "almost total," rather than simply "total." Are we not, however, justified to think that he is probably referring to those types of rhythm which could be divided into equal parts and which are not few in the so-called "oriental" music? The probability of this reference increases when we learn that, talking about "meter" and "accent," Sachs takes a look at some Greek rhythms—whose system is basically considered as additive by him—to reveal exceptions: "'meters' of two equal members such as in Greece the pyrrhic ♫, the proceleusmatic ♫♫, the spondee ♩♩, and the dispondee ♩♩♩♩, are divisive and multiplicative rhythms" (ibid.: 29). If this is true, we would have to read the first quotation of this part in the following way: "A few oriental rhythms are divisible into equal parts, many of them are indivisible and even more ones are indivisible into equal parts." Clearly, the point is not clear at all.

If we ignore this contradiction about the condition of the equality of parts in divisibility as Sachs's main criterion for distinguishing between the two types of rhythm, there remains the possibility that he defines oriental rhythms in terms of

the arrangement of different time values and has taken such arrangements to provide the distinction between these kinds of rhythm and has thus drawn on these two terms (i.e., divisive and additive) to show the distinction. The way Fārābi explains rhythmic cycles in the chapter "On Composing Short Melodies," in *Ketāb-e Musiqi-e Kabir* (*The Grand Book of Music)*, completely matches the impression that oriental rhythms seem to be created by putting together different time values. In this chapter, Fārābi introduces various durations in the form of conjunctive rhythms and then creates disjunctive, or actual rhythmic, cycles, by arranging these durations together (see Fārābi 1996/1375: 490-93). It is also clear that these durations are determined by attacks (*naqre*s)[*1], not, as Sachs tries to prove, by accents. Of course, he admits of the fact that accent does not play an important role in such rhythms since, immediately after attributing both metric and accentual aspects to additive rhythms, he adds, "obviously, the metrical aspect is more important. Meter is essential, while the accents, often very weak, are accessory as means, and nothing but means, to an end" (Sachs 1953: 93).

The important point concerning Fārābi's method of explaining rhythm, however, is that he has dealt with this after discussing rhythm in the chapter "The Principles of the Art of Music." In fact, in the chapter "On Composing Short Melodies," he has deliberately used a "different way of expressing the matter" than the one used in the previous chapter (i.e., "The Principles") to "help the listener most easily memorize [the rhythmic cycles]" (Fārābi 1996/1375: 486). This method is just a simplification of the concept of rhythm, and what has been presented in "The Principles," and later in Fārābi's *Ketab al-Iqā'āt,* should probably be taken as the main conceptual-theoretical foundation of rhythm in so-called oriental music.

But what is this conceptual-theoretical foundation? Both in "The Principles" and in *Ketāb al-Iqā'āt*, Fārābi is concerned with proving that rhythm is not created except through the inequality of durations. I have formerly discussed the fact that one way of creating rhythm is precisely using unequal durations which are specially found in Iranian-Arabian-Turkish music and in the prosody of Persian and Arabic classical poetry (Fātemi 2013/1392: 145-47). Fārābi's point of departure for making a "natural" rhythm is only an attempt to remove the monotony produced by a series of equal durations in what he calls a conjunctive rhythm. In *Ketāb al-Iqā'āt*, he states that "natural rhythmic cycles are primarily found in disjunctive rhythms and then in the conjunctive ones which are capable of becoming disjunctive" (Fārābi 2004/1383: 16). Somewhere else he writes,

> In this way, conjunctive rhythms are created out of the original rhythm. But if these rhythms do not change and continue based on that origin, they would be defective and unpleasant. Therefore, when they [i.e., musicians] want to use these rhythms, they change them in one way or another to make them different

[*1] [Usually the term *naqre* refers to the way in which a particular rhythmic cycle is subdivided over its fixed number of pulses. The author refers to these subdivisions with the word attack, which in English generally means the moment at which a sound begins. The author uses the word 'attack' to refer to the subdivisions of the rhythmic cycles and refers to these subdivisions as either long or short. Eds.]

> from the original form. In this way, they become disjunctive and [...] more pleasing and sweet. (Fārābi 1996/1375: 491)

Hence only disjunctive rhythms, that is, those with unequal durations, should be considered as natural and perfect ones, which are sweeter and more pleasant than conjunctive rhythms with equal time values. While, in the chapter "On Composing Short Melodies," and to simplify rhythmic cycles, Fārābi puts different durations of his "own choice" together (ibid.: 491) to produce disjunctive rhythms, in "The Principles" and in *Ketāb al-Iqā'āt*, he adopts a completely different method. In this method, rather than adding or putting different durations together, he inserts spaces between the equal parts of the conjunctive rhythms. For instance, he inserts spaces between each one, two, three or four attack*s* in a series of shortest possible attacks (the duration between two *ta*'s) to make the following rhythms, respectively:

- A conjunctive rhythm with shortest possible attacks: *ta ta ta ta ta ta ta ta*. . .
- A disjunctive rhythm in which each short attack is separated from the next by a doubly long one: *ta* ***nan*** *ta* ***nan*** *ta* ***nan***. . .
- A disjunctive rhythm in which each two short attacks are separated from the next two by a doubly long one: *ta ta* ***nan*** *ta ta* ***nan*** *ta ta* ***nan***. . ., which is often written as *ta na* ***nan*** *ta na* ***nan*** *ta na* ***nan*** . . .
- A disjunctive rhythm in which each three short attacks are separated from the next three by a doubly long one: *ta ta ta* ***nan*** *ta ta ta* ***nan*** *ta ta ta* ***nan***, which could also be transcribed as *ta na na* ***nan*** *ta na na* ***nan*** *ta na na* ***nan***. . .
- A disjunctive rhythm in which each four short attacks are separated from the next four by a doubly long one: *ta ta ta ta* ***nan*** *ta ta ta ta* ***nan*** *ta ta ta ta* ***nan***, which could also be transcribed as *ta na ta na* ***nan*** *ta na ta na* ***nan*** *ta na ta na* ***nan***. . .

Each of these rhythms could be changed by different techniques such as *tayy* [which consists of suppressing an attack without suppressing its duration. S.F.]. For instance, the last rhythm could be changed into *tan ta na nan* by applying the *tayy* technique to its second attack, *ta na nan tan* by applying it to its fourth attack, and into *tan tan tan* by applying it to the second and fourth attacks (for these, see Fārābi 2004/1383: 24-26). Thus, a rhythmic cycle of a quarter-note plus a half-note (*tan tananan*) is produced not by putting together these two durations but by inserting spaces between clusters of four shortest possible attacks in a conjunctive rhythm and then applying *tayy* to its second attack.

To explain European bars in terms of the same process, we could easily argue that this kind of bar is created by converting a conjunctive rhythm into a disjunctive one, albeit in a different way. A 3/4 bar, for example, is created by making disjunctive a series of beats with quarter-note durations that have followed each other in a conjunctive rhythm. Disjunction is carried out here by accenting in one way or another (creating any sort of inequality other than that of durations) the first beat in each cluster of three beats, so that the conjunctive rhythm of *tan*

*tan tan tan tan tan* . . . would be converted into the disjunctive rhythm of ***t****an tan tan* ***t****an tan tan* ***t****an tan tan* . . . .

It seems that we should consider these two rhythmic systems as different because, to achieve periodicity—which is the primary principle in the formation of meter or measured rhythms—in a set of similar durations which are not periodic, each of the two systems resorts to a different method of creating inequality. The oriental system resorts to making unequal durations, while the Western system practices other methods without changing the durations of beats. Based on Sachs's own terms and definitions, we rather expect him to take the first system as "metric" and the second as "accentual," terms that could replace "additive" and "divisive" to make the distinctions between these types of rhythm easier to grasp.

Another issue in Sachs's theory is the claimed strictly fixed nature of original rhythmic configurations resulting from arrangements of durations. What he says regarding this, "disturbing offbeats, ties, and tests in accented places are inadmissible in principle. They would destroy the identity of an additive pattern," is complemented by what he says regarding the degree of the melody's dependence on such a rhythm:

> The melody is never independent of the drum. Though the voice may give itself up to emotion or playful fancy, yet the drummer will mark the rhythm and firmly force melodic freedom into some rigid pattern of meter and accent. (Sachs 1953: 88)

Attributing such characteristics to the music of the Near and Middle East would not seem unreasonable in the first place. Although Sawa takes all the techniques of rhythmic change that Fārābi refers to—from *takrir* and *taz'if* to *tasdir* and *tayy* (see Fārābi 2004/1383: 19)—to be decorative techniques in composing and playing music and "intended to enhance creativity and produce a unique aesthetic effect" (Sawa 2003/1382: 72), these techniques are apparently employed to produce new rhythmic cycles from primary ones. Thus, the technique of *tayy* in the above example is not used to decorate and change a certain cycle during performance, but to convert one cycle into another. For example, *tan tananan* is changed into *tan tan tan* to create a new cycle in composing music. Actually, the composer would either use the first or the second; he or she would not sometimes make use of the second as an ornamental form of the first in a single piece of music. The same could be said of more recent sources. In fact, it is possible that, for instance, the various forms of the *ramal* rhythm (*tan tananan tan tananan*, *tan tan tananan tananan*, and *tananan tan tananan tan*), which Safi od-Din (Ormavi 2006/1385: 191-93) has referred to, were themselves independent rhythms.

Yet, musical practice in the Near and Middle East, whether in the past or in more recent times, has apparently never been as strict as Sachs suggests, either in performing rhythm or in the dependence of the melody on the rhythm, but it seems that it has been even very flexible. Fonton (1999: 43 [read: 61; S.F.]), in the middle of the 18th century, after introducing the common rhythmic cycles of Ottoman music, describes Ottoman musical practice in this way:

> But, often there are great masters among them who change the bars [cycles] so much during performance that others cannot recognize them. It is not that they deviate from them, for they do not approve of this, but that they add all sorts of decorations and musical delicacies that are not understandable to ordinary people and which consist of some harmonious agreements that are called *nagmets* by oriental people.

Also, d'Erlanger describes the musical practice of Arabs in the late 19th and early 20th centuries in the following way:

> The irregularity of some accents and the exaggerated use of secondary beats variously nuanced to stress the melismas and ornamental notes, as well as omitting some of the main beats, which are nevertheless counted in the mind, all of these new Arabian rhythmic features, often damage the unit of the bar. And yet, this unit is not less present in the mind of the rhythm performer although it is no longer apparent. (d'Erlanger 2014/1393: 12)
>
> Some of the rhythms which seem compatible to 2-beat bars at the beginning of the cycle immediately go beyond it because the insertion of a triple element destroys the previous order. Inserting 3-beat (limping) bars, in the middle of a serious of 2-beat bars in Arabian music is common and produces a very favorable effect. (ibid.: 14).

Mohāfez, in a detailed study of *doyek* rhythms and their use in the Persian *pishrows* (*ağami pishrows*) of Ottoman music, concludes that ignoring the rhythmic configuration of the cycles in the musical practice of that period was not a matter of exception but that "old music composers deliberately made the rhythmic appearance of the melody line different from the appearance of the cycle line, and by using this technique, in a sense they made the structure of the music rhythmically double-layered " (Mohāfez 2014/1393: 76).

There are also older instances of this method of musical practice. Owbahi has referred to such cases and, apparently for the sake of keeping the overall rhythm, has not favored exaggeration in this regard:

> And the accompanying attacks (the cycle accompanying the melody; the rhythmic cycle), when a rhythmic melody is performed [. . .], if not matching all initial attacks (the initial attacks of the tones; the rhythm of the melody), must be in agreement with most of them [. . .], unless there is intention to make a rest or an extension, and these are possible through the techniques of *tayy* and *nashr* of some parts of the melody at points where such initiatives are required to make the performance more beautiful. At these points, there will be beats, not words. (Owbahi 2007/1386: 113)

Even if we ignore all this evidence, the fact remains that Sachs himself makes his theory relative. After reminding us of the necessity of the use of such words as "in principle" ("distributing offbeats, ties, and rests where these should be accents are inadmissible, in principle") to avoid mistakes and giving examples from Bach, Beethoven, Schubert and Brahms to prove the unification of the two preliminary concepts of rhythm (divisive and additive) in the orient and occident in the past and present, he writes,

> The spondee, the dactyl and the anapest of the Greeks may be meant to be 'additive,' but since they can be divided by two, they are also divisive. And our […] 3/4, although divisible by 3, is even in modern Western music as a rule iambic or trochaic, that is, 'additive' in the sense of 1+2 or 2+1. (Sachs 1953: 26)

The same doubts could be found in today's theorists. London (2001/1992: 31) argues that the two terms, "divisive" and "additive," are confusing and he gives the same example provided by Sachs regarding triple meters which could be both divisive (or multiplicative) and additive (with the same components of 2+1).

In the following pages, we will see that we may distinguish between oriental and occidental rhythms using another concept which does not entail the problems associated with Sachs's two terms.

## 2. Isochronic Rhythm and Bichronic Rhythm

The most important musicologist who first proposed the concepts of isochronic and bichronic is Romanian Constantin Braïloiu, who presented the theoretical foundation of these concepts in two important articles on Romanian *giusto* syllabic rhythm and Turkish-Bulgarian *aksak* rhythm (Braïloiu 1951: 1952).[2] To put it in a brief and simple way, we may contend that, contrary to what is believed and deeply rooted in Western thinking about music and rhythm, the durations between all pulses in music cannot always and everywhere be measured with a single unit of time (for instance, a quarter-, an eighth- or a sixteenth-note, for which other durations are integer multipliers); in many types of music, these durations could be measured with two (or more) units of time whose ratio to each other is 2 to 1 or 2 to 3 or other ratios.

Understanding this phenomenon and the related notions would not be initially easy. How can we possibly imagine measuring durations in music by means of two time units with a ratio of 2 to 1 while not being permitted to take the unit with the value of 2 as twice the unit with the value of 1 and thus refer to that very system in which durations are integer multiples of one time unit only? Suppose we have an eighth-note and a quarter-note in the second (bichronic) system. Why should we take them as two time units with a ratio of 2 to 1? And why not take them as two durations, one of which is one time unit (an eighth-note) long and the other two time units (a quarter-note = 2 eighth-notes) long? A similar question could be asked about the bichronic system whose units are in a 2 to 3 ratio to each other.

As pointed out earlier, Braïloiu introduced these two systems in two articles. The first article concerns a type of Romanian songs which makes use of two fixed or unchangeable ratio of 1 to 2 (Braïloiu 1952: 118) and he calls it a "*giusto*

[2] Of course, it should be noted that, before Braïloiu, Bulgarian musicologists and Béla Bartók had also considered the Bulgarian or *aksak* rhythms. Apparently, even Greek Aristoxenus had called this rhythm *chorios alogos*, meaning "the illogical trochee." Two Bulgarian musicologists, Dobri Hristov and Vasil Stoin, studied these rhythms in the early 20th century for the first time (Fracile 2003: 198).

syllabic" rhythm, with "*giusto*" in the sense of "uniform, regular movement, as opposed to *rubato*" and "syllabic," suggesting that the changing quantity (duration or length) of the syllable is the only rhythmic principle of these songs in such a way that "meter is the source of rhythm and the only thing that can explain it" (ibid.: 117-18). Next, he adds that this type of rhythm, *giusto* syllabic, "basically belongs to vocal music" (ibid.: 118).

A few pages later, Braïloiu explains the issue of the bichrony of *giusto*-syllabic rhythm, which is our main and challenging concern here:

> For musical translation of any syllables of verses or refrains, the *giusto*-syllabic rhythm possesses only two values (long and short), which are exactly twice as much as or half each other, and nothing can prevent us from representing them by eighth- and quarter-notes: this rhythm is completely bichronic. [. . . ] The values of long and short are fixed and, let me say, "metronomic" (measurable with a metronome) and, additionally, are "non-compound" and indivisible, in the sense that breaking them into parts (monnayage)—which is common by the way—only produces melismas and no syllable can be sung with a note less that an eighth-note long. (ibid.: 121)

Thus the values of long (quarter-notes) and short (eighth-notes) in the *giusto*-syllabic rhythm are in a ratio of 2 to 1 and, in this way, neither is divisible nor made up of, for example, two eighth-notes or four sixteenth-notes. It does not mean that we couldn't break them, say, into two eight-notes or four sixteenth-notes for a quarter-note, and two sixteenth-notes for an eighth-note, but that even if we do so, for the quarter-note, no more than a long syllable, and for the duration of the eighth-note, no more than a short syllable would be sung. The rest of the small notes within these durations would take the role of melismas.

In the rest of the article, Braïloiu gives a list of rhythmic combinations used in the *giusto*-syllabic rhythm all which could match Greek configurations and carry their names. Some of these configurations are pyrrhics (two eighth-notes), iambs (an eighth, a quarter), trochees (a quarter-note and an eighth-note), spondees (two quarters-notes), anapests (two eighth-notes and a quarter-note) and amphibrachs (an eighth-note, a quarter-note, an eighth-note). In this way, all of these rhythms could be justified as bichronic although their relation to Greek versions requires further investigations.

What he writes in the second article regarding the bichronic rhythm with a ratio of 2 to 3, however, is more important and relevant to our argument. What is more, we no longer need the condition of being vocal to explicate it. In order to describe the *aksak* rhythm, Braïloiu starts with the Western rhythms to prove that "the building block in this system is a 'unit' of duration or a fixed 'time' which creates preliminary groups called 'bars' which are incessantly repeated" (Braïloiu 1951: 73) and to conclude that "our [Western] rhythmic system is *monochrone* because it makes use of only one unit of time at a time' (ibid.: 74). Then, he explains the *aksak* rhythm in the following way:

> Due to its certain features, *aksak* is different from the classical rhythm and due to some other features it is similar to that rhythm. The difference originates in its fundamental "irregularity," which is primarily caused by its frequent use of

> two units of duration—long and short—instead of just one. Furthermore, there is an "irrational" mathematical relation between these two durations [. . .] which makes an *aksak* melody "limping," [. . .], a feature that evokes the name "*aksak*." These durations are neither half nor double each other but 2/3 or 3/2 to each other. If we represent the short by an eighth-note, the long would be represented by a dotted eighth-note. Therefore, *aksak* is an irregular bichronic rhythm. (ibid.: 75)

Next, he talks about the similarity between *aksak* and Western or classical rhythms and finds out that this similarity is since *aksak*, like Western rhythms, creates "bars," that is, it forms binary (2-beat) or ternary (3-beat) elementary groups which are frequently repeated without accenting the first beats in these bars. In fact, in this type of rhythm, accent tends to be on the long value.

Despite all the explanations given by Braïloiu, while the bichronicity of the *guisto-* syllabic rhythm becomes palpable through the number and length of the syllables that should be sung on each duration, it is not equally easy to understand bichronicity in *aksak*. To understand this, it is completely essential to explicate the notion of the pulse, which I will treat in the next few pages. For the moment, let us say that understanding the bichronicity of *aksak*—or all rhythms which enjoy two units of time with a ratio of 2 to 3, in general—is deeply connected to bodily reactions to rhythms. And let me also make it clear at this very point that all rhythms known as oriental which Sachs thinks are formed by putting together the values of 2 and 3 (2+3+3, 2+3+2, etc.) are nothing but bichronic rhythms with two units of time having the ratio of 2 to 3. Old musical sources, especially since Safi od-Din, have identified these two units with *sabab-e ẖafif* and *vatad-e majmu'* and have marked them with two solfegic terms of *tan* and *tanan*. It would be easy to comprehend this bichronicity by naturally pronouncing these solfegic words in any optional configurations. All we need to do is to take each solfegic word for a pulse or a beat and synchronize bodily reactions, such as the movement of the hand or the head or the whole body, with each beat and then repeatedly read the configurations such as *tanan tanan tan*, *tan tan tanann tan tanan* and *tanan tan tanan tanan* in 3, 5 and 4 beats, respectively. The result would be measures of 3, 5 or 4 unequal beats which are clearly limping. This would prevent us from mistakenly considering the resulting bars as 8- 12- and 11-beat measures. Now let us take care of the issue of pulsation.

## *The Pulse and Musical Time vs. Physical Time*

Basically, it is the French musicologists after Braïloiu who have engaged with the issue of the bichronicity or heterochronicity of rhythms in several articles (Arom 2004; Bouët 1997; Estival and Cler 1997; Cler 1994; Lambert 2012). The main concern of these articles, in addition to the treatment of some examples of this rhythm in musical practice, is the theoretical discussion about explaining bichronic rhythm using available concepts, a discussion which could lead two musicologists like Bartok and Braïloiu to two different directions. At the centre of attention in these discussions are the issue of pulses (beats), the smallest unit of time, the integrity or lack of integrity of unequal durations forming rhythms and the effect of

tempo on understanding a rhythm as bichronic. We may claim with certainty that, of all these French researchers, it is only Jacque Bouët who has clearly and carefully explained the notion of the pulse and has distinguished it from the smallest unit of time. For this discontented musicologist, with the proliferation of *homometronomicus* (metronomic human being), who knows no other pulses except that of disco (Bouët 1997: 108), distinguishing between "musical time" and "chronometric" or "physical time" for understanding pulsation in music is essential: "it would never be enough to repeat that structuring the musical time and measuring the chronometric time are two fundamentally different cognitive activities which should be clearly differentiated" (ibid.: 112). In a harsh criticism of Arom, who confuses the unit of measurement (*étalon*), the pulse, and the shortest duration, Bouët correctly separates these concepts from one another: the unit of measurement, which is related to physical time or chronometric time, could only be a completely fixed and unchangeable unit like the second, while a pulse or, in his own more accurate terms, the time between two pulses, is subject to change (ibid.).

Consider a 4/4 bar. The space between each two pulses in this bar could be divided into 2 or 4 equal parts, each of which could be the unit of measurement. Therefore, it could be said that the time of this measure is equivalent to 8 or 16 units of measurement, but the number of pulses is still 4. A reduction in the tempo would not lead to changes in the number of pulses, but the time between the two pulses would be increased. Now what happens to the unit of measurement? Its number would be changed, but not its time. Let us suppose that the tempo is halved. In such a situation, the 8 units of measurement in the previous form of the bar would be changed into 16 in the new form, and the one which was 16 in the previous situation would be changed into 32. In conclusion, the physical or chronometric time of the measure in the first form is 8 or 16 units of measurement, and its physical time in the second form is 16 or 32 units of measurement, but the musical times are both four pulses. The physical time has changed, but the musical time has remained unchanged, and this is all since the unit of measurement has remained unchanged, but the time between the two pulses has changed.

It is also true that, often depending on the levels of melodic articulation and phrasing, pulsation could have different levels. In a musical sentence of four bars, each consisting of two double-bar phrases which are each made up of two single-bar motifs of 4/4, could, at a level above the bar, be perceived in terms of pulses which are spaced one bar apart, in a way that the whole sentence would be heard in the form of four beats (the pulses separating the motifs), or at a higher level, could even be heard in two beats (the beats that separate the phrases). Lerdahl and Jackendoff have partly devised their theory because of differences in the levels of pulsation (see Lerdahl and Jackendoff: 1983) although one may question their exaggeration in assuming pulses at very high levels which go beyond several measures and are hardly perceptible, where their "metric analysis" becomes, as they admit, "open to interpretation" (ibid.: 22). No matter how many levels of pulsation we take to be perceptible, it remains true that the pulses and spaces between them are different from the unit of measurement.

Now we should agree with Bouët who argues that identifying the measuring unit (or let's say, Greek *chronos protos*) with pulses—a practice which is nowadays common among many musicologists and which is probably, as Bouët thinks, a result of the connection Malzel's metronome establishes between musical time and physical time—has led to the disappearance of irregular pulses or, in the precise words of Bouët, "irregular pulsational oscillation," from musical time in the mind of the *homometronomicus* (Bouët 1997: 112). In other words, nobody recognizes the existence of pulses with irregular spaces between them.

The disappearance of this phenomenon has had an unfortunate effect on understanding the so-called limping or oriental rhythms. Despite Braïloiu's arguments, these rhythms are still comprehended in terms of the *chronos protos* or measuring unit. Consequently, a combination of 3+3+2 is taken as an 8-beat rhythm or an isochronic 8-beat rhythm, rather than an irregular 3-beat or a bichronic 3-beat rhythm.

The same mistake has been made by researchers except Bouët who are nevertheless aware of the bichronicity of these rhythms and speak accurately about it. Jerome Cler considers the theory of *aksak* in the same article where he mostly treats the issues of tempo and accent. After apparently admitting of Braïloiu's idea and calling *aksak* bichronic, when he intends to find the stressed beats in a piece with an *aksak* rhythm of 2 2 2 3, he counts nine pulses (Cler 1994: 189). The justification for this approach comes three years later in a coauthored article where he and Jean-Pierre Estival give this explicit definition of the pulse as "an isochronic unit of measurement [*étalon*] constituting the *cultural* reference unit for measuring the time" (Estival & Cler 1997: 38). As if this amount of emphasis were not enough, a few lines later and to remove any possible uncertainty on the part of the reader, they emphatically remind us that "the isochronous character of the pulse seems essential to us" (ibid.). As we can see, even those few theoreticians who have talked about *aksak* or limping rhythms after Braïloiu and have recognized their bichronicity did not recognize pulses with irregular intervals. The situation of Simha Arom, who has been the main target of Bouët's harsh criticism, is thus completely clear. Arom is the most misunderstood theorist when it comes to defining meter, rhythm, pulse and the unit of measurement. Concerning the unit of measurement, after categorizing metrical organization into regular and irregular, he considers the former type of organization as one in which we can divide the rhythm into "isochronous pulses which are in turn divisible into equal units," thus turning the value of this pulse into the standard value, or *étalon* (Arom 2004: 21). He also takes the latter (irregular) as an organization in which, due to its fast tempo, the rhythm cannot be divided in this way and thus, "the standard value (*valeur-étalon*) necessarily coincides with the fundamental value, which is often the shortest" (ibid.). On the next page, he explains that there are thus two types of standards (*étalon*): the pulse and the fundamental value or the *chronos protos* of the Greeks. The pulse constitutes the basis of the bar in occidental music while the latter is the unit of measurement of all types of music with "asymmetrical periodicity" (again, another controversial term!) whose rhythm could not be divided into equidistant pulses and which, due to their fast tempo, do not allow a division of the fundamental value

(ibid.: 22). Now, as can be seen, there is total confusion here: 1) the fundamental unit of measurement (*étalon*) is both the pulse and the fundamental value (*valeur fondomentelle*) or the *chronos protos*; 2) in the second type, that is, *aksak* or oriental rhythms, we have only the *chronos protos* as the unit of measurement, and therefore, 3) we should forget about the existence of any inequidistant pulses or, let's say, bichronic or heterochronic pulses, and if we come across any cases which could not be divided into equidistant pulses (3+2=5), we should think of the fundamental value as the unit of measurement, not of inequidistant pulses.

The way out of this confusion is the one proposed by Bouët. The unit of measurement (*étalon*) is the fundamental duration, or the *chronos protos*, which measures physical time, and this is totally different from the pulse which measures musical time. The latter measures musical time in Western music as well as in oriental rhythms and even in a fast *aksak* rhythm of 2+3=5. In the last case, the physical time is 5 (5 times the fundamental value) and the musical time is 2 (2 unequal pulses whose distances from each other and from the beginning of the next cycle, which is a repetition of the first cycle, are two and three times the fundamental value, respectively).

### *Integrity and gradation (edrāğ)*

Another important issue regarding oriental—or, in Braïloiu's and his followers' words—*aksak* rhythms, is understanding the integrity of divisions worth 2 or 3 which are specified through pulses. When it is stated that those parts or units are determined through inequidistant pulses, we should conclude that they cannot be taken as 2-beat and 3-beat measures, respectively, because they are by no means divisible into pulses with smaller intervals. In other words, the lowest level of pulsation, to take various levels for pulses following Lerdahl and Jackendoff, is this very point which separates them with the ratio of 2 to 3. We should understand the integrity of the parts or units in this way. This issue may mislead many into thinking that the above parts are basically indivisible into smaller units. Braïloiu gives an example which clarifies both the problem of the integrity of the parts or units and the divisibility of them into small segments:

> When it [the tempo] is moderate, it often happens that the units are subdivided. That is what made some people take some divisional values for real units and led them to confuse, for example, a ternary measure comprising a long time value [such as 2 2 3] with a Western 7/16. (Braïloiu 1951: 76)

This is what has almost always happened. What the Western theory considers to be 5-beat and 7-beat limping measures resulting from combinations of 2-beat and 3-beat bars (2/4+3/4, and 2/4+2/4+3/4) is by no means related to the bichronic rhythm of *aksak* or oriental rhythms.

In the latter type of rhythm, units of 2 or 3 values are each one of one pulse, not of two or three pulses.

As pointed out earlier and as Braïloiu has clearly explained, we should by no means assume that these units are indivisible into smaller parts. Both the 2's and the 3's could be subdivided into the smallest parts allowed by the tempo of the

piece, without these new small parts ever being reckoned as beats or pulses. Cler has showed this by studying Turkish *teke*, *sipsi* and *zeybek* dances, in all of which the melody is divided into smaller parts in each pulse (Cler 1994: 186-92). This is, in fact, the point at which we should discuss the issue of *aksak* tempo which has preoccupied some theorists. Although Braïloiu clearly contends that "the absolute speed of beats varies in a very wide range" (Braïloiu 1951: 75), Arom insists that *aksak* generally has a fast tempo (Arom 2004: 11) and holds that "it is only the change [i.e., increase; S.F.] in the tempo that makes the asymmetric or 'limping' quality of *aksak* perceivable. Therefore, the tempo is an appropriate criterion for recognizing *aksak*" (ibid.: 12). Again, categorizing types of *aksak* into "quasi-*aksak*," "pseudo-*aksak*" and "authentic *aksak*," Arom reckons the latter—which "is founded on the combinations of binary and ternary cells (e.g., 3+2= 5, 2+2+3=7) and the sum of which corresponds necessarily to a prime number"— "to have been performed at a fast tempo" (ibid.: 24). His insistence on tempo once again originates in his fundamental error of ignoring the reality of irregular pulsation. He holds that it would not be possible to clearly perceive the limping quality of such rhythms in slow tempos because, in these conditions, we could divide the rhythms into regular and equal or isochronic pulses (ibid.: 12).

I must leave more detailed discussions on the features of *aksak* for another time. Also, much has been said about the perception of flexible rhythms as asymmetric and about the relative and culture-based perception of *aksak* rhythms (see Jean During 2014; Cler 2010). Another related topic concerns the issue of commetricity and contrametricity, which consist of the compatibility or incompatibility of the melody's rhythmic divisions with the divisions of the large metric unit (cycle or measure). This is the very point Sachs proposes about additive versus divisive rhythms. He argues that the former are defined by rejecting offbeats, syncopation and other elements which change the configurations (contrametricity), which means they are always commetric, and the latter—i.e., Western music based on bars or measures—can accept such rhythmic interferences and are, therefore, considered contrametric. Cler, who follows Braïloiu's theory and his bicronicity-based approach to explaining oriental rhythms and nevertheless favors Sachs's theory, clearly attributes the two qualities to these two types of rhythm (Cler 1994: 190, 202 , 207; 1997: 61; 2010: 83). On the contrary, Jacques Bouët takes a different position regarding both tempo and the issue of commetricity/ contrametricity. He clearly contends that "not only is the slow tempo *aksak* far from inconceivable but it actually exists. It is even widespread in Transylvania" (Bouët 1997: 114). He is equally clear on the second problem: "The *aksak* rhythm is not necessarily commetric to the extent at which rhythm and meter are completely confused in it. *Aksak* assumes an underlying meter with which the rhythm plays with the help of often contrametric and dislocated segments" (ibid.: 119). I have already given quotations by modern and old musicologists on the contrametricity of oriental rhythms and deviation of the melody from rhythmic configurations. A typical example of contrametriciy in the *aksak* rhythm can also be found in Fracile's article (Fracile 2003: 202).

Although Arom's exaggeration regarding the effect of tempo on the identity of the *aksak* rhythm is not acceptable, I think, any bichronic or heterochronic

rhythm at very slow tempos inclines towards isochronicity. This needs to be discussed and pondered in the future, but it should be noted here, for the moment, that the issue of long and slow cycles in the rhythmic system of Iranian-Arabian-Turkish music and their metric reality have always been a matter of controversy. Regarding long and slow rhythms of the classical music of central Asia, Kordmafi argues that understanding them as rhythmic and metric units in their totality is not possible and that we can comprehend them only as a set of smaller metric units. He writes, "although the total number of the attacks of the *moḫmmas* cycle in *šešmaqām* exceeds the capacity of human's functioning memory [. . .], the number of metric units forming the cycle—which are five—follows the above mentioned rule and as a result, perceiving it as a set of five independent cells would sound reasonable" (Kordmāfi 2014/1393: 13).

## 3. Heterochronic Rhythms in Iranian-Arabian-Turkish Music

At this very beginning, it should be noted that bichronicity is not unique to Iranian-Arabian-Turkish music, and that, as a feature of rhythmic system, it could be also found in Western music, too. In other words, while the rhythm in Western music, basically and in almost all of its compositions, is isochronic, drawing on the different approach that we brought up here while dealing with Braïloiu's articles, we may reckon its *rhythmic system* as bichronic. This system enjoys two types of pulsation with two different durations, one divisible by 2 and the other by 3, with which—in the words of the theorists of this system as well as the textbooks for conservatories—it produces simple and compound meters.

Braïloiu himself has made interesting hints to this matter but has strangely not elaborated on it. He writes,

> [Western] solfeggio recognizes only four such cells [measures], two binary cells (2/4 and 6/8) and two ternary cells (3/4 and 9/8), in a way that the difference both between the two binary cells and the two ternary ones would be discernible only when the units are divided. At this point, immediately the serious defect of our notation is exposed: the denominator 8 in the 6/8 and 9/8 bars is just a graphic subterfuge to which this notation resorts only [. . .] because it lacks the means to express a unit which is not divisible by 2 (ibid.: 74).

This reveals well that for Braïloiu, too, the way we show the binary and ternary bars of the second type—that is, what we often take to be compound meters—is unreasonable and that we do so because we have no other option. This means that while 2/4 and 3/4 correctly and clearly show that each bar is made up of two or three pulsations with a duration of 1/4 of a whole note (i.e., a quarter-note), 6/8 and 9/8 wrongly suggest to us that each bar consists of 6 or 9 pulses with a duration of 1/8 of a whole note or 1.5 times the duration of the pulses of 2/4 and 3/4 measures (i.e., a dotted quarter-note). Since Western notation has not found a sign (denominator) to represent this unit, it has of necessity again drawn on a fraction of a whole note, this time taking 1/8 as the measuring unit of the bar.

Thus, it could be well perceived that the Western rhythmic *system*, too, makes use of two types of pulsation and two times for measuring rhythms which are comparable to "tan" and "*tanan*" of the oriental system. The only difference, which is of course fundamental, is that, contrary to oriental music, these two pulses do not, in principle, come together in the same piece. In this way we may claim that Western music is principally isochronic in rhythm although we should consider its rhythmic *system* as bichronic.

Regarding the heterochronic rhythm of Iranian-Arabian-Turkish music, as Jean Lambert has correctly pointed out (Lambert 2012: 36) we should pay attention to the dual approach theorists have adopted to explicate its rhythmic system: one based on Greek *chronos protos* and the other on bichronicity or, in my opinion, on heterochronicity, which depends on prosodic feet. These two approaches have often gone hand in hand, but in some periods, especially, as we have seen above, for Fārābi, the former has been preferred over the latter. Contrary to this period, when we get to the systemeatist school, apparently, the latter is preferred. Safi od-Din Ormavi, in *Ar-Risāla tash-Sharafiya fin-Nasab at-Ta'lifiya*, basically starts talking about rhythmic cycles at the very point when Fārābi began by writing about conjunctive and disjunctive rhythms. Safi od-Din, like Fārābi, describes various times in their lengths and, naturally, begins with the shortest "indivisible" one, which is created of two attacks between which no attacks could come. It is like "rapidly saying tan tan tan," which Ormavi calls time A and names the other times which are two to four times this shortest value times B, C and D, which are represented, respectivelt, by *tan*, *tanan* and *tananan* (Ormavi 2006/1385: 183). As Ḫazrā'i puts it in the introduction to Ormavi's book, he probably wrote this treatise after *Kitāb al-Adwār* (*The Book of Cycles*) and was seemingly influenced by Fārābi (Ḫazrā'i in Ormavi 2006/1385: viii), and thus, it is possible that the absence of a discussion on conjunctive and disjunctive rhythms *Kitāb al-Adwār* could be due to his lack of acquaintance with Fārābi's work at the time of writing the treatise. Therefore, in *The Book of Cycles*, the author almost directly starts describing the constitutive parts of rhythms and showing the distinctions between them in terms of prosodic terminology: *sabab-e saqil* (*tana*), *sababe-ḫafif* (*tan*), *vatad* (*tanan*) and another time which he calls "*faseley-e soġrā*," namely, *tananan* (Ormavi 2001/1380: 72[-73]). He then further explains them and calls the times resulting from these values again A, B, C and D and then immediately discusses "the rhythms which are well-known among Arab musicians" (ibid.: 74).

The other books and treatises written after Ormavi treat the issue of rhythm in these two ways, but what is significant here is the fact that the times thus defined, when used to introduce common and well-known cycles, truly acquire the characteristic of pulses with different durations. Among these, the first one, time A or the time one would need to pronounce "*ta*" of *sabab-e saqil* (*tana*), seems to have a different role and is still utilized as the fundamental unit or the measuring unit of physical time. The author of *Dorra tot-Tāj* considers this as "the shortest time which could be used in composing melodies" and takes it to be "the presumed unit." He notes that "time A is the presumed unit and measures the other times," (Širāzi 2008/1387: 154). He then explains the relative – here, "presumed" – nature

of the unit by writing that "the time is called the fundamental unit because we cannot insert another attack in the middle of it in a way that is useful for composing melodies, not because the time itself is incapable of being divided" (ibid.). He thus makes it clear that this presumed time is not in itself and truly the shortest possible time in music. Rather, although it could be divided into smaller times, it is not practically utilized, except for making tremolos (*tarʿid*). Once again, in the following pages, when rejecting Safi od-Din's criticism of Fārābi regarding some of his calculation of certain rhythmic cycles, Širāzi writes, "we said earlier that time A can in fact be divided into many smaller parts, but these are not capable of being utilized as times in rhythm" (ibid.: 156). Another important point Širāzi expresses is that "although time A could be in composition, it is far from being consonant and is thus little used." He then considers time E (*fāsele-ye kobrā* or *tanananan*) also to be hardly used except between cycles and argues that times B, C and D (*tan*, *tanan* and *tananan*) are the most frequently used ones (ibid.). We will talk about the significance of this argument later.

Some musicologists after Širāzi have similarly discussed the issue of time A as the unit of time. Marāġi, for instance, repeats Širāzi's words in his books and expresses the same opinion concerning the frequency of the usage of these time values and is at times even more clear than Širāzi when he writes, "but *sabab-e saqil*, *vatad-e mafrūq*[3] and *fāsel-ye kobrā* are not used in rhythmic times" (Marāġi 1991/1370: 254; see also Marāġi 2009/1388: 235-36; 1977/1356: 90). The anonymous author of *The Persian Book on the Art of Melodies*, written perhaps between 1406 and 1421 (Hossaini in Anonymous 2012/1391: 17), has taken time A as the unit of measurement and has clearly called it the *chronos protos*: "therefore, they investigated the times of melodies and took the shortest as the measuring unit, as are *man*, *mesqāl, paymāne*, etc. and called that unit the chromos protos and considered its value as equal to the time needed for pronouncing a consonant-vowel pair [like '*ta*']" (Anonymous 2012/1391: 165). Mobārākšāh Boḫāri, like Fārābi, stresses the relative nature of this time when he says, "know that there is no specific limit in measuring this primary time [*chronos protos*], but it is necessary that the ratio of the secondary time to the primary be 2 to 1, that of the third to the primary be 3 to 1 and that of the fourth to the primary be 4 to 1" (Mobārakšāh Boḫāri 2013/1392: 254). Owbahi, too, has talked of the possibility of further dividing the primary time – and therefore its relative nature and being presumed as the shortest possible time or unit of measurement: "and sometimes they have the primary time, as do some skillful musicians in practice, and they call it *marġul* (melisma), *taz'if* (doubling) and *tar'id* (tremolo)" (Owbahi 2007/1386: 112).

[3] I think the reason why some rhythms in Arabian-Turkish music are called "*aksak*" is the use of *vatad-e mafrūq* (*tanna*) in them. Otherwise, it is not clear as to why a rhythmic system which is essentially based on "limping pulses" should call only a few of its rhythms "*aksak*" or "limping."

### *Two Different Approaches to Rhythm*

What distinguishes Qotb od-Din Širāzi from other theorists of ryhythm not solely the point made above. Most significantly, he is seemingly the only person who has been fully aware of the distinction between the two approaches to rhythm, one based on conjunctive and disjunctive rhythms and the other based on studying the common cycles used by his contemporaries. He informs us that "there are two methods of classifying rhythmic cycles: one is the method taken by the philosopher Abu Nasr [Fārābi] and the other taken by contemporary musicians, and we will certainly explain both here" (Širāzi 2008/1387: 154). He then further clarifies the first method, which concerns conjunctive and disjunctive rhythms, by drawing solely on the time values A, B, C, D and E – with the first as the presumed time value and the rest as two to five times the value of the first. Contrary to Safi od-Din, he does not make use of solfegic words (i.e., *tan*, *tanan*, etc.) or their prosodic forms to explain the method, but rather explicates his point using overlapping cycles in which again the same time values (A, B, etc.) only are used (ibid.: 155-75). Next he takes care of the second method and from the very beginning, by referring to "the practitioners," he makes it clear that the second method (of his contemporaries) is based on the common practice of music. Interestingly, in Kowkabi Boḫārā'i's treatise, too, which was written long after *Dorra to-Tāǧ*, we come across a part revealing that the masters of music apparently were aware of the distinction between these two methods of representing a theoretical and a practical approach. Kowkabi refers to the issue of the first method by saying that "Fārābi also writes about the division of rhythms into different cycles by dividing the times between attacks in an equal or unequal way" (Kowkabi Boḫārā'I 2003/1382: 56). He adds that this method is considered as "virtual" [that is, "theoretical"; S.F.] by the masters and takes the explication of rhythm using prosodic terms as the "real" [i.e., "practical"; S.F.] method:

> And I am here relating to you what Ḫāǧe Yusof Borhān told others. Borhān, who was my teacher's teacher and a student of skillful musician Abdolqāder, has said that these rules are virtual [i.e., theoretical]. But in reality [that is, in practice; S.F.], rhythm [is; S.F.] to express certain amounts of time values inserted between tones whose relation to the melodies is like that of meter to poems. And the relation of the inserted time values to this amount is like that of poetic feet to meter. (Kowkabi Boḫārā'I 2003/1382: 56)

Let us return to *Dorra tot-Tāǧ*. In the part concerning rhythm, that is, when describing the second approach, Kowkabi explains the logic of the existing cycles through a top-down approach, breaking the cycles down into smaller units as well as using the time tools *tan*, *tanan* and *tananan* and comparing rhythmic cycles with poetic meters, unlike the first part in which he, like Fārābi, explains the logic of formation of disjunctive rhythms from rhythmic elements by means of a bottom-up approach (Širāzi 2008/1387: 159) and even making use of prosodic feet to demonstrate cycles. Although he briefly talks about conjunctive and disjunctive rhythms, the issue of explicating the overall form of an existing cycle as a combination of various time fragments—instead of putting spaces between similar parts of a conjunctive rhythm to achieve a real disjunctive rhythm—is highlighted

here. In fact, the point has been so much highlighted that the necessity of the existence of a long-time value or interval (*fāseleh*) between each two rhythmic cycles disappears: "if the parts of a cycle are different in terms of length and positional relations to one another, they may sometimes help form the cycle in a way that a longer time would not be required to separate the first cycle from the second" (ibid.: 158). Another interesting point in Širāzi's demonstration of the second approach is that, unlike the first method in which the *chronos protos,* or time A, was of primary importance in measuring time, there is no mention of this time and its prosodic representative, *sabab-e saqil*, here: "therefore, the rhythmic cycle's attacks are used in a way that some [letters of the solfegic words; S.F.] would be CV's [i.e., *ta*'s and *na*'s; S.F.] and some of them C's [that is, ending n's; S.F.] and the way they are ordered is either in the order of *sabab*s [CVC; S.F.], like *tan*, or *vatad*s [CVCVC; S.F.], like *tanan*, or *fāsele*s [CVCVCVC or CVCVCVCVC; S.F.], like *tananan* and *tanananan*" (ibid.). In the next stage, the author explains the "cycles actually used by the musicians" of his own day using solfegic words and prosodic feet. This is completely different from Fārābi, who, even in describing the cycles actually practiced in his day in "Composition of Short Melodies," still resorts to the concept of the *chronos protos* and a single syllable of tan whose various lengths are represented either by dots under or accents on it (Fārābi 1996/1375: 499-509). Širāzi, in these explanations, calls these parts, which are represented by *tan, tanan, tananan* and, probably, *tanananan*, "rhythmic items," (*fusul-e iqā'i*) and, regarding the position of attacks in relation to these items, he writes, "And it is customary that the composer, in order to keep the rhythmic times and the equality of the cycles, moves his hand or something else to go with some of the CV's to make sure he keeps the rhythm in the right form. And those attacks are customarily those of the beginnings of the items" (ibid.: 159). In other words, to keep the rhythm or the meter, while creating a melody based on a cycle, the composers mark the beginning of the items, which are the *ta*'s of *tan, tanan*, etc., using their hands or another tool.

The significance of marking the first *ta*'s or realizing them in the performance of rhythms has been expressed in many texts where the *ta*'s of solfegic words, as opposed to the na's, which may or not realize, are considered as "the main CV's (*a'madeh-ye harakāt*)" (see, for example, Ormavi 2001/1380: 76; Marāġi 1991/1370: 259; 1977/1356: 93 and 2009/1388: 238-9). It is also true that, according to *Dorra tot-Tāğ* and other sources, some of these *ta*'s are not realized either and only a few points of the cycles are marked, which are referred to as "the principal beats (*zarb-e asl*)." He explains that "these [composers], being skillful, drop most of the beats in such a way that they mark only the first beat of the cycle and the beginning of its last item" (ibid.). The principal beat has also been mentioned in other sources, albeit in different ways (see, for instance, Ormvni 2001/1380: 75; Marāġi 1977/1356: 91, 95; 2009/1388: 238, 240). Therefore, it seems almost certain that dropping the beats on *ta*'s would not change the reality of the cycle time, but, as Širāzi claims, it is an outcome of the composer's (or perhaps even the performer's) skill. Thus, the time reality of the cycle must, most probably, be the form which is performed by realizing the main CV's (*ta*'s) in a way that, as Marāġi puts it (2009/1388: 238), "a rhythmical cycle would be formed in

the imagination." That is, for a *saqil-e avval* cycle (*tanan tanan tananan tan tananan*), it would be in the form of *ta--ta--ta---ta-ta---*, something that reminds us of non-equidistant pulsation.

To sum up, the two methods demonstrated in *Dorra tot-Tāǧ* represent two different approaches to the explication of rhythm and rhythmic cycles:

1. The first one is basically theoretical and, by means of a bottom-up approach, seeks to depict the way real rhythmic cycles usable in composition are formed out of theoretical conjunctive rhythms, or, as we might say, the way metric rhythm is formed out of a set of equal and uniform beats. Here, he draws on the concept of the *chronos protos* or the measuring unit of physical time.
2. The second method is essentially based on common musical practice, and, by means of a top-down approach, tries to explain why the real rhythmic cycles used in musical composition are formed. Here, it utilizes the solfegic words (*tan*, *tanan*, etc.) and prosodic feet—which, in view of the discussion of *aksak* rhythms, are nothing but non-equidistant pulsas with ratios of 2 to 3 (*tan* and *tanan*), 2 to 4 (*tan* and *tananan*) or 3 to 4 (*tanan* and *tananan*) used to measure musical time. As times A and E are rarely used, we may not talk of the ratios of 1 to 2 (ta and tan) or 2 to 5 (*tan* and *tanananan*) with certainty. Therefore, it seems that oriental rhythms are trichronic.

## *Sabab-e Saqil and the chronos protos*

Let us linger more on the last point, namely, the absence of the ratio of 1 to 2 between the pulse durations. This is an important point because the possibility of marking the optional attacks, namely, *na*'s, especially in *tanan*, which (in Širāzi's words) divides the item into two beats with a ratio of 1 to 2, may lead us to an opposite result and to the acceptance of such a ratio as we find in Braïloiu's *giusto*-syllabic rhythm. Jean Lambert presents a similar understanding of the rhythm of an Arab folk song in his study of Arab folk music (Lambert 2012).

In fact, our understanding of *sabab-e ḫafif*, *vated-e majmū'* and *fāsele-ye soġrā* as different durations of pulses in a heterochronic musical system could be questioned. In this way, if old musicians intended the very things that we have comprehended, why should specially *sabab-e saqil* be taken as an exception and the ratio of 1 to 2 be ignored? And if *sabab-e saqil* has been introduced, as we claim, solely to determine the primary time or *chronos protos*, how can we prove that they did not introduce *sabab-e ḫfif*, *vatad* and *fāsele*, as *Persian Book on the Art of Melodies* (Anonymous 2011/1390 [read: 2012/1391; S.F.]: 165-66) and Owbahi (2007/1386: 111) put it, simply to introduce the second, third and fourth times?

I have claimed so far that the rare usage of this time has been the reason for this matter and I am going to stress this reason here. In addition to what I quoted from Širāzi and Marāġi, there are also other proofs to support the case. Although, talking of unused parts, Banā'i mentions *vatad-e mafruq* and *fāsele-ye kobrā* only

(Banā'i 1989/1368: 104-5), when he writes at the end of his argument about rhythm that "it should also be noted that in all these cycles mentioned here, the the t's will be marked except in *sari-'ol-hazağ* [*tana tana tana . . .*; S.F.] and *ḫafif-'os-saqil* [*tan tana*; S.F.], where the n's are also marked" (ibid.: 121), he points out not only that marking n's is not a principle but also that *sabab-e saqil* is rarely used, especially because *sari-'ol-hazaj* is not a practical cycle, but a conjunctive rhythm which only reveals the value of the *chronos protos*. As the author of *Kanz ot-Tohaf* (*The Treasure of Gifts*) puts it (Anonymous 1992/1371: 108), we should take this rhythm as "the measuring attack" (*naqr ol-mekyāl*), that is, the cycle that marks the measuring unit (see also Ḫazrā'i 2014/1393: 74). Also in Eḫvān os-Safā's *Mūjmal ul-Hikma*, when considering rhythms, the authors take it to be similar to poetic prosody, and when introducing *sabab*, *vatad* and *fāsele*, they omit *sabab-e saqil*, *vatad-e mafrūq* and *fāsele-ye kobrā* by not mentioning them at all (Eḫvān os-Safā 1992/1371: 51).

It may seem that the references the author of *Nasim-e Tarab* (*The Breeze of Joy*) has made to *sabab-e saqil,* which are found in many mostly unfamiliar cycles, can cast doubt on the claim of its rareness, but the author's clarifications reveal that his main concern there is the question of how to write long parts. To make it easier, Nasimi, who, following Širāzi, calls each cycle part (e.g. *tanan*s, *tananan*s, *tan*s, etc.) an "item" (*fasl*), divides the items longer than *fāsele-ye kobrā* (*tananan*), for the sake of facilitating their pronunciation, into smaller parts which, among others, include *sabab-e saqil.* For instance, a cycle named "*bešārat-e soġra*" ("little good tiding"), which consists of six items, is written in the following way: "*tan tan tana tana tananan tan tananan tananan*." However, in a note of explanation, the first two items are each a *sabab-e saqil*, and the third item is composed of two *sabab-e saqil*s and one *fāsele-ye soġra* (Nasimi 2006/1385: 105). Thus, *tana tana tananan* has been reckoned as a single item which should normally have been written as *tana-nana-nananan*. Further similar cases could be found in *ḫafif*, *bešārat-e kabir* (ibid. 104), *ğavāğak*[4] and *owsat* (ibid.:105), *heğāzi* (ibid.: 105) and others in the text.

In view of the above points, we seem justified to argue that the mention of a two-part item or component *sabab-e saqil* (made up of two attacks, *ta* and *na*) next to other simple items of the rhythmic cycles (*sabab-e ḫafif*, *vatad* and *fāsele*), whose integrity has been stressed by marking their t's, is not to ascribe to *sabab-e saqil* the same identity as the other items, but only to introduce a formula which could delineate the concept of the *chronos protos*. The way this tool or formula has been utilized effectively confirms our understanding of the case. On the one hand, *sabab-e saqil* is scarcely used as part of a rhythm (for instance, in a dactyl-like form such as *ḫafif-e saqil* or *tan tana*), and on the other, it is used to measure the physical time of the cycles, as in the case of *Ketāb al-Adwār*, which defines the *sabab-e avval cycle* in this way: "the time of each cycle is as much as the time of pronouncing eight *sabab-e saqil*s" (Ormavi 2001/1380: 74). Similarly, when defining the *saqil-e ramal cycle*, in *Maqāsid ul-Alhān*, the author writes, "the time of each cycle is as long as eight *sabab-e saqil*s" (Maraġi 1977/1356: 95). There are

[4] The pronunciation of this word is doubtful.

also other supporting examples which we do not mention here for the sake of brevity.

## Conclusion

In view of all the above arguments, we may claim that, while Sachs's approach to the so-called oriental rhythms reveal, in some aspects, their real characteristics, the approach that takes them as heterochronic both lacks the problems and complexities of Sachs's view point and is more compatible to the theoretical and practical reality of these rhythms. To take these rhythms as configurations with fixed, inflexible, and indivisible combinations of different durations would be problematic both in terms of the claimed unchangeability of their durations and combinations by itself and in terms of their indivisibility in comparison to Western rhythms (we could ask "indivisibility at which level?"). What's more, the fact of heterochronic rhythms or rhythmic heterochronicity seems undeniable. Although old books and treatises on music do not directly mention heterochronicity and do not ever ignore the unit of measurement or the *chronos protos* in measuring the time values of the cycles, their theoretical discussion of the rhythms of Iranian-Arabian-Turkish music has defined rhythmic cycles by resorting to unequal integrated units which should be perceived as non-equidistant pulses in heterochronic rhythms. This point of view would prevent us from ignoring the divisibility of such rhythms or setting a condition (such as determining levels of division) for accepting the notion of their indivisibility. Also, by taking this latter approach based on heterochronicity, we could avoid neglecting the fact of the flexibility of these rhythms and their openness to the rhythmic games and ornamentation of melodies.

Although, so dependent on Greek theories, the previous theorists of music never, as we showed, avoided using the measuring unit to show the time value of each cycle and measured the cycles by means of the number of attacks (*naqarāt*) or time A (primary time), it is also true that they made use of such notions as "item" (*fasl*) and "main CV's" (*a'made-ye harakāt*) to mark the pulse units. Thus, they proved that they were aware of this level of time value in the cycles. Since one or two centuries ago, most probably due to Western influence on them, all Arab and Turkish theorists have measured their practiced rhythmic cycles by dividing them into various measures, and—supported by the theories of the old theorists—have measured the length of the cycles by referring to the number of attacks. Thus, they take, for example, the Hendi cycle (dum tak tak, dum ess tak ess, with the "es" representing rests) to be a 7-beat rhythm and divide it either into 3+2+2 or 3+4 or even 3/4 + 4/4, while, most probably, we should consider it as a 3-beat bichronic cycle formed as *tanan tan tan*, or as a 2-beat bichronic one formed as *tanan tananan*, as was apparently customary in d'Erlanger's days, although he hasn't avoided mentioning 7/8 for it (d'Erlanger 2014/1393: 29). All the so-called 7-beat and 5-beat rhythms of today's Iranian music are bichronic rhythms which should be considered as 3-beat (*tanan tan tan or tan tan tanan*, for the former) and 2-beat (*tan tanan* or *tanan tan*, for the latter) rhythms.

Understanding heterochronic rhythms would not be possible without referring to bodily reactions. These reactions are produced in such a way that, for instance, when listening to a bichronic 3-beat rhythm like the above one at a medium or higher or even somewhat slow tempo, the body—or whatever part of it that responds to rhythm and meter (such as the head, the hands or the feet)—is never inclined to synchronize its reactions with the number of the primary times or (the seven) attacks but synchronizes them with the inequidistant pulses of *tanan* and *tan*. Naturally, the body does not move seven times to go with seven attacks but moves three times to go with three pulses, one of its kinetic reactions—which goes with *tanan*—being longer than the other two. The fact is that reducing the tempo to very slow would also reduce the effect of their bichronicity or heterochronicity. It would be almost impossible to react to an extended or long *tanan* at such tempos and in this condition the body tends to react to attacks only. Thus, we may be able to contend that heterochronicity at very slow tempos can hardly exist.

In addition to the relatively new 5- and 7-beat rhythms, we may still find the remainders of such bichronic rhythms in Iranian music, even in its *radif*, even though this music has forgotten the old rhythmic cycles. Mağid Kiāni is, most probably, the first person who has found these neglected heterochronic components in the *radif* of Iranian music and showed their efficiency in comparison with the European metrical system based on measures, to explain the metrical aspect of Iranian music (Kiāni 1989/1368: 200-210). We could clearly discern the presence of all three pulses of two, three and four times the *chronos protos*—*tan*, *tanan* and *tananan*—in *kerešme* rhythm in the form of *tanan tanan tananan tan* (ibid.: 205). The existence of *tananan* in Iranian music, both in *radif* and in melodies composed by old masterly musicians, has been ignored, even more than *tanan*, due to its divisibility by two. But this is an integrated (i.e., undivided) pulsation unit, attention to whose integrity could, to a good extent, solve some problems of understanding the rhythms of Iranian music. We may find *tananan* in the *čahār mezrāb* of *segāh* in Mirzā Abdollāh's *radif,* where, after several motifs with a *tan tan* pulse, on the sixth staff line (Talā'i 1997/1376: 158; also, listen to his performance of this *radif* in Talā'Ii 1993/1372), some ascendent motifs with a *tananan* pulse change the movement of the piece. Similarly, in the *reng* of *segāh* in Ali Akbar Ḫān Šahnāzi's *radif* (listen to Tahmāsbi's performance of the *reng* in Tahmāsbi 1999/1387), after the second sentence in the common meter of *rengs* with isochronic pulses of *tanan tanan* (which is represented as a 6/8 nowadays), the third sentence, which is overtly influenced by the ča*hār mezrāb* of *segāh*, continues the melody with *tananan* tananan *tananan* pulses.

The trichronicity of Iranian-Arabian-Turkish music does not suggest that all melodies of these cultures are rhythmically heterochronic. On the contrary, there are many cases in which the music makes use of isochronic rhythms or rhythmic cycles. What matters and helps distinguish between this type of music and European music, however, is that heterochronicity is basically a common principle in the former but an exception in the latter. We should also know that the heterochronicity of oriental music does not necessarily appear in the form of a single rhythmic cycle, but it may also appear in a series of isochronic cycles with

various pulses when equal or unequal cycles with different pulses replace one another in the musical piece. In Šahnāzi's *reng* of *segāh*, the first sentence is a *sababi* isochronic 3-beat (*tan tan tan*), the second sentence a *vatadi* isochronic 2-beat (*tanan tanan*) and the third sentence a *fāsele'i* isochronic 3-beat (*tananan tananan tananan*) one. Western music is not completely unfamiliar with these changes, but it takes them as special rhythmic changes which violate the norms through the technique of hemiola.

It seems that it would be possible to appropriately theorize about Iranian musical rhythms based on this new point of view if we stop using European measurement and conditionally accept the concept of additive rhythms. A strong theory based on rhythm or rhythmic cycles and based on the right foundations that agree with the nature of this type of music could play an essential role in further developing its rhythmic capabilities.

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