

Extrait du Rhuthmos

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Platonic Legacy (4th century BC - 3rd century AD) - part 3

- Recherches

- Vers un nouveau paradigme scientifique ?
- Sur le concept de rythme - Nouvel article

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Rhythm in Music - Aristoxenus' *Elements of Rhythmics* (4th c. BC)

The ἰστορία ῥυθμικῆς ἡμετέρας - *Elementa rhythmica - Elements of Rhythmics* were probably not the first book ever written on musical rhythm in the West but certainly the first that has been preserved at least partly (a section of Book 2) (for recent editions Pearson, 1989; Marchetti, 2009). It was part of a larger work comprising some *Elementa harmonica* which also survive incomplete.

Their author, Aristoxenus of Tarentum (c. 360 - c. 300 BC), was instructed by Pythagoreans and wrote several books on Pythagoras and his pupils. Nevertheless, around the middle of the 4th century, he chose to enter the school of Aristotle and, while making extensive use of arithmetic terminology in both his elements of harmony and rhythmic, he rejected the Pythagoreans' opinion that arithmetic rules were the ultimate judge of intervals and harmony, and probably of rhythm.

Instead, faithful to Aristotle's teaching, Aristoxenus and following rhythmicists (*rhuthmikoí*) as Aristides Quintilianus (2nd-3rd cent. AD) relied on sensation and sought to explain their objects phenomenally, that is to say,

not in terms of the physics of sound production or by abstract mathematical considerations [as in the Pythagorean school] but through principles inherent in our experience of sound as musical, and depending ultimately on *aisthêsis*, on what we perceive as melodious, concordant, and the like. (Barker 1978a, p. 16) (quoted in Porter, 2000b, p. 62)

Indeed, we read in the *Elementa rhythmica* the following assertion.

We have already pointed out that rhythm is concerned with time-lengths [*chronoi*] and the perception [*aisthêsis*] of them, and we must say it again now, because this is in a way the starting point for the study of rhythm. (Aristoxenus, *Elementa rhythmica*, 2.2, trans. Pearson).

Strikingly, Aristoxenus thinks of rhythm in an opposite way to the Moderns who consider first the whole (rhythm) and divide it into primary and secondary segments (measures and notes). He begins with what he calls the "*chronoi prôtoi* - primary time lengths" then considers the "feet" composed of two primary durations (*arsis* and *thesis*) (2.18)

and finally the series they form which he terms "rhythm."

This feature of Aristoxenus' theory of rhythm has been variously interpreted by specialists. James Porter claims that this method would entail a kind of "theoretical atomism." Rhythm would consist for Aristoxenus in a succession of "atoms of rhythm" or *chronoi prôtoi* of various shapes/durations perceivable by human sensibility. Therefore, Aristoxenus' contribution would not belong to the Platonic paradigm but to the empiricist and materialist one initiated by Leucippus and Democritus.

Following phenomenalist principles in their own way, the rhythmicists, for their part, could conceive the units of rhythm as minimal "atoms" consisting of indivisible *chronoi*, or time-lengths (quantitative durations of time) specifically, "the first duration[s] that can be grasped by perception": these are the *minima* of rhythmical *synthesis*, or composition, that get thrown into complex interrelations, the perceptual effect of which is rhythm. They are, in effect, *atoms of rhythm*. Thus, Aristoxenus, in his *Elements of Rhythm* 2.11, would coin the phrase *chronos prôtos* ("primary time-length" or "duration") and define this entity as the foundational element of rhythmical patterns. (He also devoted an entire treatise to the problem, entitled *The Primary Duration*, only a fragment of which has survived). (Porter, 2000b, p. 62)

In order to prove his case, Porter quotes Aristides Quintilianus (2nd or 3rd century AD) who compares the *chronoi prôtoi* to atoms.

Later on, in the second century C.E., the musical theorist and more-or-less orthodox Aristoxenian Aristides Quintilianus would write: "*prôtos... chronos atomos kai elachistos* [the primary duration is indivisible and smallest]" (*De musica* 1.14). This formula, *prôtos elachistos kai atomos* [or *amerês*], "first, smallest, and indivisible," is used in a variety of analytical approaches in antiquity that exhibit what might be called "conceptual" or "theoretical atomism" (the analysis of systems of relations whether made up of sound or bodies or times into constituent irreducible ["indivisible"] elements). (Porter, 2000b, p. 62)

He also recalls that Aristides Quintilianus calls, at least once, the *chronoi prôtoi* "points," referring them implicitly to the smallest and indivisible units in geometry.

Aristides, in his *De Musica* (1.14), calls these minimal lengths of distended time, "points," "just as geometers have used the term 'point' for what in their science has no parts." These are the atoms of rhythm mentioned above, whose significance is purely structural and relational. (Porter, 2000b, p. 74)

However, it is, in my opinion, quite misleading to link, as Porter does, Aristoxenus' theory of rhythm with Democritus' atomist doctrine. And that for many reasons.

1. Aristoxenus lived in the 4th century BC and therefore it is not conclusive, to say the least, to explain his thought

through the work of a thinker living six or seven centuries later.

2. As for ontology Porter himself recognizes that "the rhythmicists would not have considered themselves to be atomists of any kind and presumably would have taken no position on the metaphysical nature of time." (Porter, 2000b, p. 63) But, it is quite obvious that Aristoxenus had the teaching concerning time exposed in the *Physics* in mind when he reflected on rhythm. Time is clearly for him "number of motion."

3. Concerning epistemology, it is most probable that Aristoxenus and the subsequent rhythmicists followed Aristotle and his conception of knowledge based on observation instead of Democritus who indeed was also a kind of empiricist. As Porter himself notices, they considered rhythm in a typically Aristotelian fashion: "They did hold that rhythm is the sensuous division of time, the means by which time is divided into recognizable parts (*chronoi*) and so becomes aesthetically palpable, as an appearance, as an *aisthêsis*." (Porter, 2000b, p. 63)

4. The method consisting in reconstructing a whole phenomenon from "indivisible elements" was already used by Plato (for instance for the composition of primitive names from elements in *Cratylus*, 434 a-b) as well as by his successor. At the beginning of *Politics*, Aristotle states that he will follow in his discussion of the State his "regular method of investigation."

A proof that these people are mistaken will appear if we examine the question in accordance with our regular method of investigation. In every other matter it is necessary to analyze the composite whole down to its uncompounded elements (for these are the smallest parts of the whole); so too with the state, by examining the elements of which it is composed we shall better discern in relation to these different kinds of rulers what is the difference between them, and whether it is possible to obtain any scientific precision in regard to the various statements made above. (*Politics*, 1.1252a)

In *Poetics*, 20, he reconstructs in the same manner the whole language from the minimal vocal entities he calls "elements" ($\tilde{\alpha}\tilde{\alpha}\tilde{\epsilon}\tilde{\iota}\tilde{\upsilon}\tilde{\omega}$ - *stokheía*). These, he says, form syllables, the syllables nouns or verbs (plus conjunctions and joints), the words sentences, the sentences discourses.

Diction as a whole [$\tilde{\alpha}\tilde{\epsilon}\tilde{\iota}\tilde{\upsilon}\tilde{\omega}$ - $\tilde{\alpha}\tilde{\epsilon}\tilde{\iota}\tilde{\upsilon}\tilde{\omega}$ - *tês dè léxeôs apásês*] is made up of these parts: [element] [$\tilde{\alpha}\tilde{\epsilon}\tilde{\iota}\tilde{\upsilon}\tilde{\omega}$ - *stokheíon* - lit. *one of a series, an elementary sound of the voice, a letter*], syllable, conjunction, joint, noun, verb, case, phrase. An [element] is an indivisible [vocal entity] [$\tilde{\alpha}\tilde{\epsilon}\tilde{\iota}\tilde{\upsilon}\tilde{\omega}$ - *stokheíon mèn estin phonê adiaíretos* - lit. *undivided*], not every such sound but one of which an intelligible sound can be formed. Animals utter indivisible sounds but none that I should call an [element]. Such sounds may be subdivided into vowel, semi-vowel, and mute. [...] A syllable is a sound without meaning, composed of a mute and a letter that has a sound. [...] A noun is a composite sound with a meaning, not indicative of time, no part of which has a meaning by itself [...] A verb is a composite sound with a meaning, indicative of time, no part of which has a meaning by itself just as in nouns. [...] A phrase is a composite sound with a meaning, some parts of which mean something by themselves. (*Poetics*, 1456b-1457a, trans. W.H. Fyfe, my mod.)

As we see, in *Poetics* these "elements" are explicitly characterized as "indivisible." But we find exactly the same idea in *Metaphysics* applied to any being, the composition of the sounds of language providing again the methodological

paradigm.

"Element" [ἄτομον - *stokheion*] means (a) the primary immanent thing, formally indivisible into another form, of which something is composed. E.g., the elements of a sound are the parts of which that sound is composed and into which it is ultimately divisible, and which are not further divisible into other sounds formally different from themselves. (*Metaphysics*, 1014a)

Given his education in Aristotle's school, Aristoxenus obviously knew about this methodological views and it is most likely that he translated them to music, which was still closely related with poetry in his time.

5. Both so called Aristoxenian "theoretical atomism" and "epistemological sensualism" are actually subjected or at least tightly articulated to the new definition of rhythm introduced by Plato and Aristotle, which is, as we have seen, utterly different from Democritus'. This succession of "atoms of rhythm" or "primary time-lengths" or "durations" is neither an "impermanent disposition of something flowing" nor a "way of flowing." Even if it is not induced anymore from number as in the Pythagorean speculations and observed through its phenomenal appearance, even if Aristoxenus takes also into account "irrational" relations between durations, rhythm consists for him as for his fellows of the Peripatetic school interested in physiology in what Benveniste described as "an ordered sequence of movements" subject to "numbers" and "divided into alternate times."

I am using for this paragraph the excellent presentation made by Marie Formarier (Formarier, 2014, p. 77). The arithmetic ratio between the duration of the *arsis* and that of the *thesis* (raising and lowering of foot or hand) makes it possible to identify to which rhythmic type a particular foot belongs. The simple ratio (2/2) defines the dactylic type, the double ratio (1/2 or 2/1) the iambic type, the sesquialteric ratio (2/3 or 3/2) the paeonic kind. If one of these three arithmetic ratios is observed in a foot, it is said to be "rational." Otherwise, it is called "irrational" (2.24, 2.30). In each of these foot types there are primary feet with a minimum number of times: three for the iambic type, two for the dactylic type, five for the paeonic type (2-31). The composite feet are made from these primary feet and the feet from primary times (2.26).

The article dedicated to Aristoxenus on *German Wikipedia* shows perfectly well this intricate relation between Aristotelian analysis, epistemological sensualism and genuine Platonic definition of the concept of rhythm itself.

Aristoxenus built his rhythmic largely by analogy to his harmonic. He used the duration ($\frac{1}{2}p$) as measure, but took also into account incommensurable durations with irrational relations. In analogy to the primary numbers ($\frac{1}{2}, \frac{1}{4}$), he defined the primary duration ($\frac{1}{2}p$) as a perceptible duration, which cannot be decomposed into several perceptible durations. He established the perceptibility of these primary durations by means of feasibility in speech, singing, or body movement (the smallest primary duration could thus be determined experimentally). This, as he emphasized, yields an infinite number of primary durations, which he used as permanent units. In addition to the smallest primary duration p , all durations between p and $2p$ belong to this ensemble. Just like Plato in *The Laws*, he defined rhythm as organized duration ($\frac{1}{2}p$) parallel to the interval form of the harmonic. (*German Wikipedia*, "Aristoxenos", my trans.)

6. The last argument against any Democritean pedigree of the Aristoxenian doctrine concerns the ontological basis of

the definition of rhythm. Endorsing Aristotle's hylomorphic conception, Aristoxenus sets a difference between $\acute{\alpha}\rho\theta\mu\acute{\iota}\sigma\mu\acute{o}\nu\omicron\varsigma$ - *rhuthmís* and $\acute{\alpha}\rho\theta\mu\acute{\iota}\sigma\mu\acute{o}\nu\omicron\varsigma$ - *rhythmízomenon*: the matter that is to be brought into form, for instance the sound, the language, the marble. In musical arts, this matter is composed of the syllables of the speech, the sounds of melody, or the movements of the orchestric. Each $\acute{\alpha}\rho\theta\mu\acute{\iota}\sigma\mu\acute{o}\nu\omicron\varsigma$ is capable of $\acute{\alpha}\rho\theta\mu\acute{\iota}\sigma\mu\acute{o}\nu\omicron\varsigma$ as much as $\acute{\alpha}\rho\theta\mu\acute{\iota}\sigma\mu\acute{o}\nu\omicron\varsigma$ - *arrhuthmía*.

Aristoxenus here clearly resumes and amplifies the Aristotelian view of becoming and being, which was certainly developed against Platonic metaphysics of Forms but still maintains a dualistic approach. For Plato, Forms are eternal, immobile and independent, they reside in another world and things are only their defective replica. The becoming world is a degraded version of the Being. For Aristotle, forms are indeed eternal but they do not belong to another world, they reside within the things. Before one thing appears, it is only possibility, potentiality, *dynamis*, then it becomes actual through activity, being-at-work, *energeia*, and reaches full completion or *entelechia*, yet a completion that illustrates the *eidos* that supported the process right from the beginning, viz. from the stage of *dynamis*. Hence, to do science as well as art is reaching to the forms within the things through observation of their apparition, completion, movement, transformation and disappearance (*Metaphysics*, 1050b).

Aristoxenus has been given by specialists of the history of music a prominent place for having for the first time fully theorized harmony and rhythm. But from a rhythmological viewpoint, his contribution to the theory of rhythm, at least as far as we know it, is not as significant as it seems. Concerning rhythm, there are two sides in Aristotle work: that interested in natural science which we find in *The Physics*, where Aristotle remains faithful to Plato and to his joint conception of time and arithmetic; that more original which we find in *The Rhetoric* and *The poetics*, where Aristotle initiates a scientific knowledge, yet emancipated from mathematics, of two crucial human productions: language and poetry. Aristoxenus is clearly on the first side and his work has oriented music studies for centuries in a Platonic direction, while participating in the erasing of the poetic conception of rhythm that was also part of the Aristotelian legacy.

Rhythm in Physiology - Peripatetic School's *Problems* (4th c. BC)

In the $\acute{\alpha}\rho\theta\mu\acute{\iota}\sigma\mu\acute{o}\nu\omicron\varsigma$ - *Problemata - Problems*, which is an Aristotelian or more probably pseudo-Aristotelian collection of questions and answers gradually assembled by members of the peripatetic school, the concept of rhythm takes a very different look. The gap between the previous sophisticated analyses and the gross definitions given in passing in this collection suggests that it may have been written by one or several different hands. It also shows the surfacing of a new trend of thought.

Maybe under the influence of possible similar uses by physicians of the Hippocratic school (mid-5th c. to mid-4th c. BC), the term rhythm is now used to denote the regular respiration of a runner. "The respiration taking place at equal intervals, because it is measured out by a uniform movement, creates a rhythm."

Why is it that those who are not running very hard respire rhythmically? Is it because every rhythm is measured by a definite movement, and the movement at regular intervals which occurs in running is of this nature. As soon, therefore, as they begin to run they respire ; and so the respiration taking place at equal intervals, because it is measured out by a uniform movement, creates a rhythm. Or is it because all respiration without exception takes place at equal intervals in those who respire naturally and do not hold their breath? The rhythm then is not obvious in those who are sitting or walking, because the movement of the body is slight; and in those who are running vigorously we cannot comprehend the rhythm of the respiration, because our senses cannot follow the movement. But in those who are running moderately fast the movement allows the measure observed by the breathing to be perceptible, and so shows the rhythm. (*Prolegomena*, book 5, 882b, trans. E.S. Forster)

While endorsing the basic Platonic definition of rhythm as "order of movement," *The Problems* show a typical Aristotelian interest for empirical observation. In Book 19, the author claims that "we delight in rhythm because it contains a familiar and ordered number and moves in a regular manner." But eurhythmia is no longer imitation of the perfect heavenly movements but results from moving "according to human nature." Behaving "in an ordered manner" helps to "preserve and improve our nature and strength," whereas irregularity "destroys and deranges our nature."

Why do all men delight in rhythm and melody and concords in general. Is it because we naturally rejoice in natural movements? This is shown by the fact that children rejoice in them as soon as they are born. Now we delight in the various types of melody for their moral character, but we delight in rhythm because it contains a familiar and ordered number and moves in a regular manner; for ordered movement is naturally more akin to us than disordered, and is therefore more in accordance with nature. This is shown by the fact that by working and eating and drinking in an ordered manner we preserve and improve our nature and strength, whereas if we do these things irregularly we destroy and derange our nature; for diseases are disturbances of the natural order of the body. (*Problemata*, book 19, 920b, trans. E.S. Forster)

Although rhythm does not play a great role in *The Problems*, this collection constitutes an important token of the spreading and transformation of the concept during the 4th and maybe the 3rd centuries BC because we are not sure of the date of their composition. For the first time, at least to our knowledge, rhythm is used outside dance, music and poetry and translated to another field. By using the term rhythm to designate physiological and medical phenomena on the sole ground, as Benveniste put it, that they constitute "continuous activities" that can be divided "by meter into alternate times," *The Problems* initiate a very long process of generalization that will make the concept of rhythm under its Platonic form fit to any reality, be it human or cosmic, cultural or natural, individual or collective, which will result much later on in the development of a modern "pan-rhythmism" during the 19th century.

One can now talk about the "rhythm" of a dance, a walk, a song, a diction, a work, anything that requires a continuous activity divided by meter into alternate times. The notion of rhythm is now fixed. From $\hat{\Lambda}$ as spatial configuration defined by the arrangement and proportion of distinctive elements, one reaches the "rhythm" as configuration of movements ordered in time [*la durée*] [...], "any rhythm is measured by a defined movement." (Aristotle, *Problemata*, 882b 2) (Benveniste, 1966, p. 335, my trans.)

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At the end of the 4th century, one can observe the emergence of two opposite trends.

The first is the spreading of the Platonic concept of rhythm. In Aristotle's *Politics* as well as in Aristoxenus' *Elements of Rhythmics* and in the Aristotelian collection of *Problems*, the same common perspective can be found. Although unlike Plato these works emphasize the importance of observation, they again define rhythm as "combination of short and long, or fast and slow segments," "order of movement" or "alternation of time segments," all measured by numbers. Music theory, especially, is invaded by mathematics. In addition, this concept is now used to characterize activities which were not yet considered as pertaining to rhythm: respiration, physiology. Eventually, it will be extended by Vitruvius in the same manner to architecture while paradoxically being severed from any relation to time. Clearly, Aristotle, his collaborators and successors have been instrumental in the spreading of what may be called the *metric Platonic paradigm of rhythm*.

The second trend is far less visible. It is composed of scattered innovations which all were made by Aristotle and which deeply yet imperceptibly transformed the concept of rhythm. It has largely been ignored by specialists who,

due to lack of strong poetic theory, mainly concentrated on the first. Nevertheless it is of greatest interest to us. We may call it the *poetic Aristotelian paradigm of rhythm*.

1. In *The Politics* Aristotle first endorses Plato's holistic and hierarchical views on politics. The whole is superior to its parts, he says, the state to the households and the households to the individuals. Humans are superior to animals, men to women, adults to children, free men to slaves, Greeks to Barbarians. Nevertheless, when he considers musical rhythm his perspective somehow changes. Unlike his master who was very suspicious about the mimetic power of rhythm, he considers it not only as a powerful means of education of the citizens to be used by the state, but also as a means for the individuals of enjoyment, noble leisure, education of the spirit, and possibly of achieving goodness and excellence. This profoundly humanist and democratic intuition will be lost very soon as the Athenian democracy disappears in 322 the same year in which Aristotle passes away and monarchies develop in the Greek world. The holistic and hierarchical view that gives to the Platonic rhythm concept its ethical and political color will naturally prevail in a world in which it fits perfectly, but Aristotle alternate suggestion, as we will see, will reappear much later in the West from the 18th century on and nurture new views on the relation between subjectivity, society, state and rhythm.

2. When in *The Rhetoric* Aristotle changes focus from music to public speech, he introduces a second important innovation in rhythm theory. The study of speech makes him realize that the definition of rhythm drawn by Plato from his observation of music and dance and his Pythagorean speculation cannot be applied without change to language. Combination of short and long or fast and slow segments, or order of movement, do indeed partake in speech rhythm but they constitute only parts of it. Rhythm appears now as a larger whole that transcends metric elements as well as bodily figures. In addition, Aristotle elaborates further what he already sketched in the *Politics*. Rhythm has the power to shape the *psychè* of the individual that can be used to achieve political ends a kind of use he does not particularly appreciate but that, as a scientist, he feels compelled to examine due to its prevalence in his time or, as he explains in *The Poetics*, larger ethical objectives through *mímêsis* and *kátharsis*.

3. In *The Poetics*, Aristotle complements the changes he already sketched in *The Rhetoric* and introduces a third significant innovation. Both essays form a diptych. While the latter transforms the Platonic conception of rhythm into something larger than a mere series of metric elements or bodily figures, the former expands the previous limited utilitarian views of power of rhythm on individual psyches how to influence an audience into a general ethical doctrine that emphasizes the liberating effects of poetic rhythms. "Success" or "beauty" in "poetry in itself" is reached when the *rhythms and tunes* organizing a poetic work are good enough to trigger *kátharsis* by *re-presenting human actions and emotions*, i.e. not so much by making a faithful copy of them in order to reach the otherworldly ideas of which they are copies, as by *presenting them anew* in order to come closer to *their quintessence*. In *The Poetics*, the concept of eurhythmy, that was so important for Plato, receives a completely new meaning which is not based on *aesthetic pleasure of the spectator*, as for aesthetics, nor even on *persuasion of the audience*, as for rhetoric, but on *the ethical liberating effects produced on each one and all of us by the well rhythmized re-presentation of life*, i.e. the effective presentation of experiences, actions and characters *under new guises*. Thanks to the mediation of this larger rhythm, ethics and politics can now be based on the poetic power of language.

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