FORMAL CONVERGENCE BETWEEN MELODIC COMPOSITION AND ARABIC PROSODY

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1. A summary of the state of the art

There is a paucity of studies on rhythm in world music in general and with regard to Arabic and Oriental cultures in particular. Musicological studies predominantly focus on acoustical scales, modes, timbre, harmony, etc., unfortunately neglecting a fundamental aspect of music, that is, rhythm and its complex relationship to melody, the accentuation of words in a given language, the intonation and prosodic organization of the poetic text that is set to music, and finally the performance of rhythm with its timbral characteristics.

Arabic music is primarily vocal and its structure is especially well adapted to singing through the use of musical intervals that are easy to control (notably conjunct motion between adjacent scale degrees), of ornaments that are centered on particular pitches, etc. Yet the composition of melodies is mainly based on the metrical structure of the poetic text. Hence, analyzing a piece of music (be it vocal or instrumental) that belongs to the oral tradition without taking into consideration the prosodic rules of the Arabic language would amount to overlooking one of the most significant underlying elements.

In the history of Arabic music, musical instruments have always played a secondary role as accompaniment to sung poetry, free singing, etc. Instrumental pieces destined for the takht (تخت, small orchestra) such as the samā‘ī (سماعي), the lūgā (لوقة), the bashref (بشرف), etc., have existed for centuries in Turkish, Arabic and Persian cultures. Since the beginning of the 20th century, purely instrumental music (destined for large orchestras) began to develop in the Mid-East, principally in Egypt. A new esthetics emerged, based on a form of orchestral writing that tended to explore each musical instrument with regard to its individual sound universe, its technique, etc.
In the Muslim world (from Morocco to Turkey passing through Tunisia, Egypt, etc.), the few extant contemporary studies on rhythm mainly rely on ancient theories dating from the 8th to the 13th centuries, namely those of al-Kindī (c. 790–873), al-Fārābī (c. 870–c. 950), Ibn Sīnā (c. 980–1037), al-Kātib (11th century), Ṣafīyū d-dīn al-Urmawī, (c. 1216–1294), al-Boucāmī (1556–1639), al-Kātib cited by al-Hīfī (1677), and el-Hayek (18th century). More recent studies on rhythm are sometimes cited, such as those by d’Erlanger, Zakariyyā Yūsif, or Yusif Šawqi. Yet it is essentially the same ideas and the same notions, originating from the same sources, that circulate around the Mediterranean countries. Just by consulting a couple of monographs on rhythm, one can immediately realize the poverty of the state of the art and the scarcity of works in this area. An additional theoretical difficulty arises from the fact that modern studies on rhythm consist for the most part in the description and the translation of ancient manuscripts (as for instance d’Erlanger).

Contemporary authors are often practicing musicians, writers or historians with little academic training in musicology. Their works frequently present specific Arabic concepts and expressions that are difficult to interpret, ways of thinking that prove impossible to follow, or superficial attempts to interpret complex notions of rhythm. Conversely, the works of the great theoreticians of the Middle Ages remain important in view of the history and evolution of Oriental Arabic musicology. However, contemporary globalization, with the broadening of fields, the fusion and blending of musical styles and social practices that go along with it, makes it no longer possible to look at modern music by relying solely on ancient theories for at least the following reasons:

(i) Classic authors aimed at laying the foundations of a general theory of Arabic music (Turkish, Persian, Arabic, etc.) but not at providing an in-depth study of precise elements of the performance, analysis and perception of rhythm within definite cultures or musical repertoires.

(ii) Descriptions made for analytical or practical purposes exemplified the rhythms that were known at the time (common rhythms used in older and newer compositions as well as others that were more rarely performed) but are mostly no longer in use nowadays either in popular or in art music. What remains of the musical her-
itage of the Middle Ages are mainly names of the rhythms, rather than their actual content. To complicate things, the designation of rhythms can change from one Arabic country to the other: thus the six-beat rhythm called basīṭ (بسيط) in Morocco is called mhajjer (محجج) in the Mid-East, etc. (The same difficulty obtains in relation to modes.)

Modern publications on rhythm, therefore, present descriptive studies that do not rest on any precise methodological foundations and, though sometimes of great quality, are often subjectively biased. In spite of the numerous criticisms that can be directed at these studies (pointing their lack of methodological coherence, their inappropriate vocabulary, the superficial character of their descriptions, etc.) their basic interest is not called into question. Yet no recent study of rhythm shows a personal involvement from the author to critically reassess ancient theories and to redefine practical and perceptive concepts to accommodate the nature of rhythm in the 21st century.

2. The science of meter (al-ʿarūḍh)

Arabic poetry (when sung naturally) and music have been intimately related throughout their existence. The rhythm of melodies is originally rooted in Arabic metric. Music cannot be conceived without poetry, which itself is musical and rhythmical, and reciprocally. In order to analyze a piece of music (be it vocal or instrumental), it is therefore necessary to study the fundamental connection between the musicality of the poetic text (through the sonority of the words, their intonation, etc.) and the rhythmic structure of the melody.

Traditionally, Arabic meter (الرhythm, al-ʿarūḍh) is defined by a set of formal and systematic regularities that determine the measured lines (بيت, bayt) of a poetic text. The most frequent meters (رحب, bahr) in poetry were codified in the 8th century by al-Khalil bin Ahmad al-Farāḥīdī (718–791) and have not changed since then. Meter (bahr) is based on syllable lengths, which can either be short or long.

In Arabic, short vowels are twice as short as long vowels. If we associate to the long vowel the rhythmic value of a quarter note, the short vowel will have the value of an eighth note. The rhythms of
Arabic music can therefore be conveniently represented by simply using quarter-note and eighth-note durations. (See the representation of meter el-moutakārib [المطاطرب] in example 1).4

Ex. 1. The meter el-moutakārib.

Thus, poetry is not only based on lines and rhymes, but also on a certain internal rhythm within each line. The line is always divided in two isometric sequences (or hemistiches): the first is called sadr (صدر) and the second 'ajez (عجز) (see the arrows to the right of example 1). The determination of a particular iqā' (إيقاع, rhythm), and its underlying naqrāt (نقاط, beats), is based on the rhythm of Arabic prosody, in particular el-sabab (السيب), el-watad (الوتد) and el-fāsil (الأفصل).

The different meters are distinguished by the number, order and alternation of short and long syllables. Here are some names of meters (بحور, plural of بحر) that rule the different rhythms of Arabic music,5 based on the ordering of short and long sounds (syllables): el-tawīl (الطويل), el-kāmil (الكامل), el-wāfi ir (نافر), el-rajaz (الرجز) (form often used in improvisations), el-hazaj (الهجاز), el-basīt (البسيط), el-khaffij (الخفيف), etc. (See example 2.)
3. Defining rhythm in Arabic music

In Arabic music, there is no real equivalent to the term ‘rhythm’. The two nearest notions are mīzān (مِزَان) and iqāṭ. But musicians and musicologists often confuse these two notions.

Based on our field experience and on the interviews conducted with masters of the art and artists of the Mediterranean region, mīzān is an indication of rhythm that designates the number of units in a rhythmic cycle (or measure), for instance: 4/4, 10/8, etc. Percussive instruments such as the duff (ذف, large frame drum) play a fundamental role in the orchestra by emphasizing—due to their timbral particularities—the most important elements of the rhythm, its basic structure, i.e. the representative rhythmic pattern.

Even more complexly, in the Maghreb, among the five main mawāzīn (مَوَازِين, plural of mīzān) at the core of Arab-Andalusian music, mīzān ḫṭāyḥī (مِزَان خَطَّاهِي, 'mizān that which is suited') is played during three successive parts of the Moroccan nūba (نُوْبَة), el-mawse (المَوْسَى), el-qanṭara (القَنْطَرْا) and el-insirāf (الإِسْبَرْعِي, 'the flight'). In each of these parts, the interpretation of the mīzān (which is what the iqāṭ consists in), takes a specific form, characterized by a variety of sounds, ac-
cents, punctuations and tempos. At the beginning, *iqā bīṭāyihī* (إيقع بيثيحي) is played with quarter notes in a slow tempo, then later with eighth notes, then with sixteenth notes, each time in a progressively faster tempo.

Indeed, the *iqā* lies at the core of the melodic composition, and is probably the main element in the constitution of the rhythmic structure of melodies and the determination of temporal units. The *iqā* concerns the division of the musical time based on different types of beats, or *naqarāt* (نقارات). According to al-Fārābī, Ibn Sīnā, al-Kindī, Şafiyyu d-dîn al-Urmawī and Abd al-Hamīd al-Lādīqi, *iqā* is defined by *el-naqra* (النقلة, beat type), *el-zamān* (الزمان, duration) and *al-dā‘ira al- iqā‘yya* (ال دائرة الإيقاعية, rhythmic pattern).

3.1 *El-naqra* (beat type).

There are several types of beats:

(i) “Weak beats” (or gentle) and “strong beats” that mark the main accents of the rhythm.

(ii) In the introduction to his *El-iqā‘at et-khamsa* (الإيقاعات الخمسة), Abd el-Fateh ben Moussa mentions the addition by al-Fārābī of another type, “medium beats” (الانسمام, *el-ashmām*), which are used to enrich the temporal span through ornamentation between weak and strong beats, or during stops or silences. *El-ashmām* are sometimes difficult to perceive, count or quantify in terms of duration when the rhythm is performed.

(iii) Besides strong, weak and medium beats, el-Hasan ibn Ahmed defines two supplementary, yet extremely important beat types (*نقرتين*, *naqratayn*) that serve to ornament rhythm through *addition, substitution and interpolation*:

- *naqrat el-majāz* (نقعة المجاز), which is a “trope” beat that marks a comma, a distinction between two rhythmic patterns,

- and *naqrat el-ia‘timād* (نقعة الإعتماد), defined as an “accrediting” beat added at the end of the second pattern, and which marks the conclusion of the melodic movement.

3.2 *El-zamān* is the duration between two beats (*naqratayn*). Ancient theorists proposed two kinds of durations: a “long duration” and a “short duration.” For Şafiyyu d-dîn al-Urmawī, the time unit
was a very short duration that could not be further divided. The duration of the beats in ancient Arabic music was determined on the basis of this small unit: from the smaller to the longer duration, through multiplying by two or three, etc.

3.3 El-dawr el-iqā’i (الدور الإيقاعي, rhythmic cycle) corresponds perfectly with the meters and the lines of the poetic text, which is based on strong and weak syllables and commas. There is indeed no difference between the two: one single rhythmic grid underlies the poetic text at the same time as the accompanying musical composition.

In general, in relation to iqā’, theoreticians distinguish between el-mawsila (الموصلة, simple rhythm) and el-mafslā (الفصلة, composed rhythm):

(i) According to Şafiyu d-dīn al-Urmawi, el-mafslā is as succession of naqarāt (beats) determined by isochronous durations (“simple rhythms”).

(ii) El-mafslā is a succession of beats determined by different durations (“composed rhythms”). A composed rhythm can contain a group of isochronous beats and others with different durations.

4. Teaching music in the context of oral tradition

The maqām (مقام) music of the Mediterranean region relies on oral transmission and teaching, on the interaction between master and student, between musicians, etc. Indeed, there is no musical text (in the sense of a written text as in Western music), but rather a knowledge that is recorded by the collective memory in the form of interpretation processes, traces and sketches that stem from one or multiple models.

The relationship between musician (whether actor, or creator) and music is singular in the context of oral tradition, with respect to the exchanges and interactions that have just been evoked as well as the creation and the reproduction of music in the course of each performance.

First, the musician learns the repertoire, the pieces with their nuances, their past interpretations, etc., by heart, from mouth to ear. Then a second fundamental step reinforces the memorization of the repertoire. The musician has to get personally involved in the
process of creation and reinterpretation of the repertoire in different ways and on various scales through ornamentation, weaving (development), modulation, reconstitution of form and stylistic invention."

Maqām music is based on orality and personal interpretation, but there is always a background and a common source on which the social group that performs it agrees and is able to rely. Musicians interpret the repertoire with great freedom, but they will never neglect its skeleton, the deep structure of the piece, the reference and the voice of the masters (their style, technique, way of listening, etc.). Musicians respect the models (i.e. the general characteristics of the repertoire or those of particular pieces) that they studied, learned and memorized, but what is asked of them in this context is to demonstrate their creativeness through their ability to reconstruct the models.

Maqām music is memorized in the form of sound material (outlines, melodic turns of phrase, guidelines, operational processes, etc.) that is flexible and allows reconstructing and reading anew during each vocal or instrumental performance. There are several musical elements to explore in the process of ornamentation, interpretation and improvisation that depend on the poetic text, on rhythm, on maqām, on context, on the musician’s inspiration, on emotions, etc. Musicians are both constrained by the models and norms imposed by the masters and by tradition, and at the same time free to be inventive and create their own musical forms and thus add their own signature to the process of interpretation.

One of the difficulties that concern the teaching and the transmission of such knowledge is that in oral cultures, there are no pre-established texts or common teaching methods of rhythm, instruments, ornamentation, interpretation, or improvisation (rhythmic or melodic). Thus, masters have to rethink the process of transmission and invent their own program and teaching methods based on their experience, analytical capacities, their own outlook on tradition and on music. The main objectives for masters are:

(i) To show the authenticity and characteristics of the repertoire to be taught (poetry, rhythm and melody);

(ii) To propose new perspectives of interpretation of the repertoire, based on other masters, or other ancient or modern schools;
(iii) To demonstrate ornamentation, and explain how and where to ornament a rhythm, or a particular degree of a modal scale;
(iv) Finally, to propose axes of reflection (melodic and rhythmic explorations, modulation processes) in order to involve the disciple in the musical interpretation.

5. Rhythm in the Arabic-Andalusian music of Morocco

An important characteristic of Arabic music in general—and of Arab-Andalusian music in particular—is the *iqā** (rhythm), which lends it its dynamic structure, its specific sound and timbre. In the Moroccan *nūba*, the technique of performing the *iqā** and sounding the main percussive instrument, the *tār* (تار), play a key role in the perception of the music. This is an ancient technique, originating in Andalusia, which consists in rotating and orienting the *tār* with the hand in all directions in order to produce metallic sounds that come from the interactions between the twenty small cymbals fixed to the frame of the instrument (see example 3).

Ex. 3. The Masters of Andalusian music in Raba, at Morocco: Abdes-salam Amlehi (*tār* player) and Mohammed Harât (ancient *rabāb* player, رباب). Both traditional instruments are of Spanish origin.

The *tār* has a fundamental role in the performance of the Moroccan *nūba*. If the *tār* player himself is not a conductor, he is always a guide for the other musicians, and gives them fundamental indications about rhythm, attacks of phrases, cadenzas, tempo, etc.
When listening to Moroccan Arabic-Andalusian music for the first time, it is relatively difficult to determine the temporal units of the rhythm precisely. Even a percussionist from another culture might experience some difficulty in following or reproducing the rhythm and perceiving its underlying structure.

As a preparation for future experimental studies on the perception of rhythm, the present author carried out a small experiment in Istanbul with a professional percussionist who has a wide knowledge of Mid-East ancient and modern music alike (Turkish, Iranian, Syrian, etc.). The percussionist, Ynon Moualem, had occasional difficulty in improvising on a popular Moroccan rhythm because he could not always identify the rhythmic cycle, the shape of the model, the tempo, the accents that sometimes appear isochronously, etc. This suggests that the perception of rhythm in Moroccan music in particular is highly dependent on a particular type of listening and on a deep knowledge of the fundamental rhythms that subend the Moroccan nūba with their variations (in respect of form, sound, tempo, etc.).

The following points may explain this perceptual problem:

(i) In practice, if all orchestral musicians for instance use the eighth note as the base time unit, the tār player, on the other hand, will explore another, lower hierarchical level, taking for instance the sixteenth note or even the thirty-second note as the time unit. This allows greater freedom of interpretation in relation to the underlying rhythmic grid, thus making it easier to ornament, improvise, vary the rhythm by slowing down or accelerating, etc.

(ii) Some rhythms of the Moroccan nūba seem perfectly similar in terms of the position of strong and weak beats and the number of temporal units making up the rhythmic pattern (or the measure), yet are actually very different in terms of sound.

(iii) When performing constitutive parts of the Moroccan nūba, basic rhythms change either in terms of form (presenting completely different variations with regard to the model) or in terms of tempo.

(iv) Finally, some rhythms seem almost similar to the ear and the listener tends to consider them as variations although, in reality, they stem from completely different rhythmic models.
6. The five rhythmic successions of the Moroccan nūba

The Moroccan nūba is composed of five fundamental mawāzīn:

– el-basīṭ (البسيط),
– el-qāim wa nisf (القائم ونصف),
– el-bṭāḥi (البطاحي),
– ed-darj (الدرج), and
– el-qoddām (القدم). 10

6.1. El-basīṭ, in 6/4, is the only nūba mīzān based on three different kinds of rhythm: el-msaddar (المصدّر) for the singing part, jawāb (جواب) for the orchestra’s instrumental response, and el-insirāf (الانصراف) where the mīzān is cut in two to become a faster rhythm in 3/4 (example 4).

Ex. 4. The 6/4 el-basīṭ (12/8 for the tār player).

The Arabic letters on the top of the eighth-notes indicate the way to produce sound according to the way the instrument (tār) is held:

Hit with the forefinger at the edge of the instrument: س/ح
Hit on the full frame of the instrument: ق/ح
With the hand that holds the instrument in the center: يم/و
Hit on the empty frame of the instrument: ق/م ف

6.2. The four remaining mawāzīn, beginning with el-qāim wa nisf in 16/16 (example 5), leave the iqā’ unvaried while they are played to an increasingly quicker tempo during the constitutive phases of the nūba.
6.3 The mīzān el-bṭāyiḥi, in 8/8, resembles the mīzān el-qāīm wa nisf, particularly with respect to the duration of the time units, but it includes naqarat (accentuations) and has different strong beats. For the tār, the bṭāyiḥi is quantified at the sixteenth note, and is thus in 16/16. In the successive phases of the nūba, the mīzān el-bṭāyiḥi remains identical but is only played faster (example 6).

Ex. 6. The mīzān el-bṭāyiḥi in 16/16.

6.4 Ed-darj, in 4/4, is a purely Moroccan rhythm that has been integrated in the ancient Andalusian nūba in order to add a Moroccan signature to it and enrich it with a popular rhythm. The music
played in Moroccan religious communities nearly always follows
the 4/4 mīzān ed-dārj. The tār plays it in 8/8 (example 7).

Ex. 7. The mīzān ed-dārj (in 8/8) is a popular Moroccan rhythm.

[Direction of reading]

The Arabic letters on the top of the eighth-notes indicate the way to produce sound according to the way the instrument (tār) is held:

- Hit with the forefinger at the edge of the instrument: س ح
- Hit on the full frame of the instrument: ق ح
- With the hand that holds the instrument in the center: يم ح

6.5 The mīzān el-qoddām is in 3/4 and in 6/8 for the tār (see example 8).

Ex. 8. The mīzān el-qoddān in 6/8.

[Direction of reading]

The Arabic letters on the top of the eighth-notes indicate the way to produce sound according to the way the instrument (tār) is held:

- Hit with the forefinger at the edge of the instrument: س ح
- Hit on the full frame of the instrument: ق ح
- Hit on the empty frame of the instrument: ق ق
Conclusion

Since the 17th century, the magnificent Arab-Andalusian repertoire has been preserved in the collective memory by the musicians of the Maghreb and their audiences. This repertoire follows the rules transmitted by tradition and the teaching of the masters. The definition of the pertinent features of this musical genre depends to a large extent on its performance and perception, in a context where the poetic texts and the richly ornamented melodies that accompany them are inscribed in the memory, culture and daily life of every Moroccan musician.

The discussion of the examples above has revealed the importance of specific cognitive patterns and rhythmic performance processes for the perception of the Moroccan nūba. Seeking for general features, or deriving data from the computational analysis of signal without taking into account the esthetic values of a specific social group as well as the network of symbolic and semantic significations associated with the musical fact fails to inform us about the musical practice within that group, or its inherent ways of listening to music and understanding it. The relevance of each musical element needs to be evaluated against the relation between humans and music in the specific context of performance, learning processes and transmission.

We are currently examining the possibility of directly carrying out rhythmic analyses of Arabic music on the computer, with a view to exploit the vast musical corpus collected through our fieldwork in the Mediterranean region. New algorithms for rhythmic and metric analyses of audio recordings are capable of following the precise evolution of tempo on different metric levels and of revealing many of their subtleties. Yet the application of these algorithms to the elaborate rhythms of Arab-Andalusian music and particularly to the Moroccan nūba shows that an approach conceived for the analysis of rhythm in general cannot account for the specific character of Arabic, Turkish and Greek music since it tends to flatten rhythmic complexity—from the point of view of both the internal composition of rhythm and its perception—to interchangeable binary or ternary structures.

In our research program funded by the French National Research Agency (ANR), CREMUSCULT, we use an experimental approach to study in detail the perception, analysis and interpretation
of rhythm in both oral and written compositions and improvisations of the Mediterranean region. We use a model of music cognition based on the interaction between perceptual and social musical practice (which is of special importance to this specific culture and corpus) to develop a richer computational model of this interaction. In the current state of the modeling, the approach consists of transcribing audio recordings at a proto-symbolic level where rhythmic cycles can be detected as patterns. We study the possibility for the machine to detect these patterns either in the case where no preexistent knowledge is accessible or in the case where the repertoire of patterns is integrated as cultural knowledge.

Notes


3 See al-Hāj Idrīs at-Tounī ben Jelloun, Al-tourāṭh al-arabī el-maghribi fi al-mousiqā (Rabat: Dār en-Nacher Marocco, 1940), and Abd el-Fatteh ben Mousa, El-iqā’at et-khamsa (Fes: Matba’at el-Naser, 1988).
4 A video recording of this piece can be consulted at http://www.youtube.com/watch?v=d9Jdsf32uQA.

5 *Bahr* means that Arabic poetry is rich, wide-ranging, and in perpetual movement like the sea (*bahr*).

6 *Mizān* means “model.”

7 See al-Kātib cited by ben Mousa, p. 16.

8 Ben Mousa, p. 17.


10 For more details on the five rhythmic successions of the Moroccan *nūba*, their performance techniques, their sonority and their transcription, see the videos available from the CREMUSCULT research program webpage at http://recherche.ircam.fr/equipes/repmus/ayari/ANR/MissionMaroc/Programme.html.

11 A detailed description of the ANR-funded research program can be consulted at http://recherche.ircam.fr/equipes/repmus/ayari/ANR/CreMusCult/Partenaires.html.