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English text

METRICS

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Introduction

What distinguishes metrical verse from ordinary utterances is that in metrical verse the words and phrases are arranged in such a way that they constitute a simple abstract pattern, or meter. These abstract patterns are of a fairly rudimentary character. For example, among the patterns that we shall study here are those shown in (1):

(1) a. W W W W W W W W W S

b. S W S S W W W S

c. S W S W S W S W S W S W

d. W S W S W S W S W S

Patterns of this sort are, of course, not restricted to verse. They are found in many other domains of our lives. Thus, patterns like those in (1) might be found in the arrangement of flowers in a bed where W stands for flowers of one color and S for flowers of another. Or these very same patterns might be actualized by light and heavy beats on a drum, or by long and short steps in a dance.

In order to perceive the pattern, it is essential that one know what objects or phenomena are utilized to represent the patterns; that is, what things count in actualizing a meter. For example, it is important to know that a metrical pattern can be actualized by steps in a dance and not by hand motions, or by beats on a drum, rather than by bursts of sound from some other instrument, or -- in the case of metrical verse -- by syllables rather than by words.

In what follows we shall outline a procedure for determining whether or not a particular sequence of words in some language is a lawful

embodiment of a particular metrical pattern. This procedure will have the character of a fairly elaborate computation similar in complexity to that encountered in daily life by most of us only when we attempt to determine our annual income tax liabilities. The complexity of the calculations reflects an important fact that is not always understood, not even by writers on metrics, namely that the relationship between the meter of a line and its phonetic actualization (declamation or recitation) is quite indirect. The precise nature of this indirect relationship is characterized by a system of principles (or rules) such as those illustrated below which specify the various steps in the calculation just referred to. We need hardly remark here that we do not wish to be understood to claim that poets literally perform these computations in writing verse. We do not have any special knowledge about what goes on in the minds of poets when they write metrical verse, any more than we know what goes on in the minds of soccer players when they move to engage balls kicked at them from great distances. We do know that soccer players must determine the trajectory of the ball and that of their own bodies so that the two trajectories intersect at an appropriate instant. When trajectories of objects are studied in the physics laboratory, these are described by means of differential equations. Obviously, it would be nonsensical to claim that Pelé is solving differential equations as he moves about the soccer field. Functionally, however, the equations capture an essential aspect of what is taking place. In much the same fashion the calculations that we present below are the functional equivalent rather than the actual replica of the mental operations that are required to produce metrically regular lines of verse.

The computation of a metrical line involves a number of essential elements. These are:

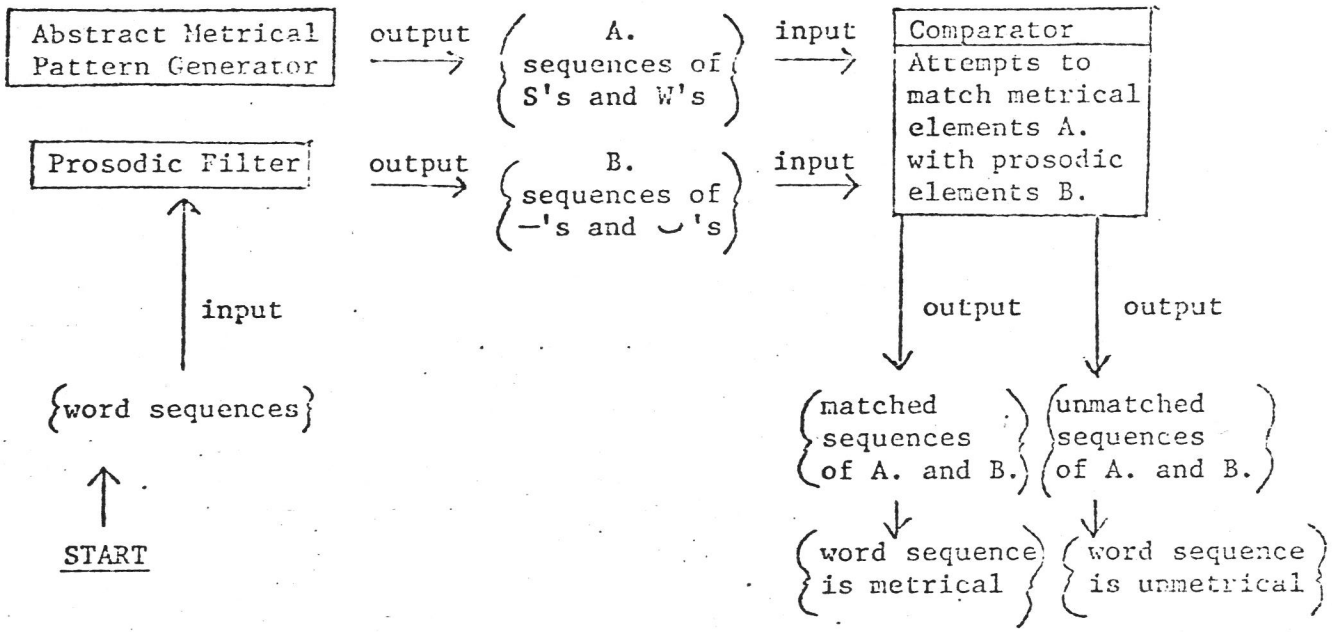
(2) a. a metrical pattern such as one of those exemplified in (1). We shall call the elements constituting such patterns metrical elements.

b. a prosodic filter or procedure for establishing what elements of the word sequence are utilized in actualizing the metrical pattern. We call these elements prosodic elements.

c. a comparison device or procedure which formally determines what prosodic elements correspond to what ~~entities in the~~ metrical ~~pattern~~ elements.

We can represent these three components and their function in the following block diagram:

(3)



The three components represented in (3); namely, the generator, the comparator and the prosodic filter together comprise a theory of meter. A particular meter will be specified by the content of each of these components. In what follows we shall represent the content of these boxes in terms of rules. Thus, the prosodic filter consists of prosodic filter rules which operate to analyze (scan) word sequences in a specific fashion. The comparator contains correspondence rules which specify whether a particular word sequence, analyzed by the prosodic filter, counts as an actualization of a specific meter. The contents of the metrical pattern generator is also specified in terms of rules which generate abstract metrical patterns. In most cases, however, these patterns are so simple that no attempt will be made to characterize the rules that might give rise to them. We shall study these rules only in the case of Classical Arabic poetry because there these rules are of a complexity that requires, as well as repays detailed study.

Whereas the generation of all metrical verse involves the three components diagrammed in (3), the actual content of the individual components, i.e. the rules, differ from language to language and from one metrical tradition to another. Below we shall examine a number of metrical traditions in a number of different languages. Since the space at our disposal is limited, we have attempted to illustrate the variety of metrical rules that one encounters rather than to provide a definitive treatment of the metrics of a given language or metrical tradition.

The Italian Endecasillabo

The abstract character of meter as characterized in terms of the theory outlined in (3) is well illustrated by the favorite meter of Italian

poets, the endecasillabo. Its name implies that this metrical pattern is actualized by eleven syllables to the line, and most literate persons in the West are familiar with the standard example:

(4) Nel mezzo del cammin di nostra vita

where indeed there are eleven syllables in the line of verse. However, even a superficial perusal of a few lines chosen almost at random -- as those in (5) and (6) -- readily shows that the actual number of syllables per line can vary considerably. (The actual number of syllables in each line is given on the left.)

(5) 12 O gran Lemene or che orator ti fé,
10 Meritamente l'inclita Citta,
12 Io ti voglio imparar come si fa,
10 Ad esser orator d'ora pro me.

(Maggi)

(6) 14 Un topo un dí, fra i topi il piu ben fatto
12 Venne d'un lago alla fangosa sponda:
15 Scampato egli era allor da un tristo gatto,
12 E calmava il timor colla fresc'onda:
12 Mentre beveva, un garrulo ranocchio
13 Dalla palude a lui rivolse l'occhio ...

(Leopardi)

The obvious reason for this great variety is that for purposes of the meter not all syllables count equally everywhere. Thus, the syllables that follow the last accent in a line are not counted in determining whether or not a line is metrical. Moreover, many syllables are metrically ambiguous. They may or may not count in a verse and it is this

metrical ambiguity of syllables that has provided Italian poets with one very important dimension of the freedom that they have required to produce verses of enduring quality. In view of this the main question that a theory of the Italian endecasillabo must answer is how syllables are counted. Recall that we are committed to answering this question in terms of the theory outlined in (3). Our answer must take the form of providing specific rules for each of the components of a metrical theory. In the light of (3) we shall assign the task of determining how syllables are counted to the prosodic filter, which we assume has the following rule:

(7) Italian Prosodic Filter Rule 1 (IPFR 1).

Assign a macron (—) to the last accented vowel in the line.

In the overwhelming majority of lines the vowel specified in IPFR 1 will be the penultimate syllable in the verse (see (4) and (6) above). Such verses are known in the traditional terminology as versi piani. There are, however, perfectly good lines where the last accented syllable is not the penultimate. In (5) we have illustrated verses where the last syllable of the line is accented; these are called versi tronchi. There are also verses where the last accent is on the ante-penult. These, called versi sdruccioli, are illustrated in (8):

(8) Nell'onda solca, e sull'arena semina,
E tenta il vago vento in pugno accogliere,
Chi fonda sue speranze in cor di femina,

(Sannazaro)

There are even verses where the last accent is on the pre-ante-penult, the so-called versi bisdruccioli:

(9) Sue parole garbate mi sollucherano
Gli occhi suoi me succhiellano, mi bucherano ...

(Michelangelo)

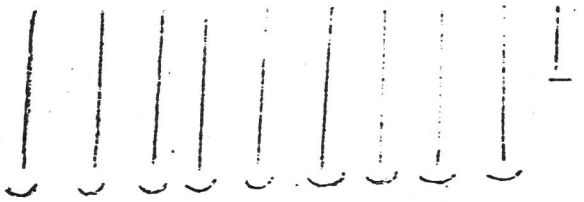
While IPFR 1 will assign a macron to the last accented vowel in a verse, there is still the question of how the remaining syllables are to be counted. To deal with this, we propose a second prosodic filter rule:

(10) Italian Prosodic Filter Rule 2 (IPFR 2)

Assign a breve (⏑) to every vowel (syllabic sound) that precedes the last accented vowel in the line.

In (11) we illustrate the operation of IPFR 1 and IPFR 2 to the line of verse cited in (4):

(11) Nel mezzo del cammin di nostra vita



by IPFR 1

by IPFR 2

The effect of IPFR 1-2, then, is to represent any given line of verse as a sequence of breves followed by a macron. In (11) this has resulted in 9 breves followed by a single macron; i.e. in ten metrically significant entities because, as we have already seen, the syllables (if any) that follow the last accented vowel in the line do not count in determining the meter. They are, of course, not disregarded, but their role is separate from that of the other syllables of the line as far as the meter is concerned. Since there are, thus, ten, rather than eleven metrically relevant syllables in lines such as (4), the term endecasillabo is strictly speaking inaccurate. We shall, however, not propose a new term here since the old terminology is well-established and its arbitrary,

purely conventional character widely understood.

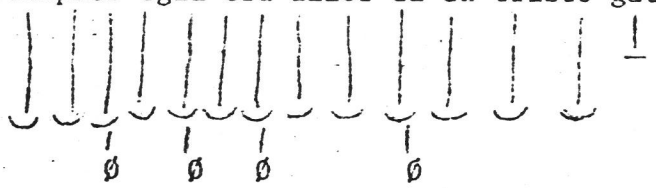
While in lines like (4) IPFR 1-2 result in an output that consists of ten metrical units, this obviously is not always the case. For example, one of the lines by Leopardi quoted in (6) above results in a sequence of fourteen units. To deal with such cases, we must add another rule to the prosodic filter:

(12) Italian Prosodic Filter Rule 3 (IPFR 3)

Delete a breve if it is assigned to a vowel that directly precedes another vowel (without intervening consonant).

We illustrate the operation of IPFR 1-3 in (13):

(13) scampato egli era allor da un tristo gatto



by IPFR 1

by IPFR 2

by IPFR 3

(where Ø means that a breve has been deleted)

IPFR 2 assigns thirteen breves to the Leopardi line in (13). Subsequently IPFR 3 deletes 4 of these, resulting in a sequence of 9 breves followed by a single macron; i.e. precisely the same output as found with the standard example (4) as analyzed in (11). In other words, IPFR 1-3 operate to analyze both lines in (11) and (13) into the same macron/breve representation, even though these lines are widely divergent in terms of numbers of syllables.

Up to this point we have illustrated how the prosodic filter component of (3) can analyze a line in terms of relevant metrical properties. It still remains to be seen how lines so analyzed are judged to be metrical.

This is the function of the comparator which takes lines analyzed like those in (11) and (13) and determines whether the lines so analyzed constitute an actualization of the abstract pattern provided by the generator. For the endecasillabo the abstract metrical pattern provided by the generator is:

(14) W W W W W W W W W S

In order to determine whether a line analyzed into a sequence of breves and macrons is an actualization of (14), the comparator requires a specific rule, a rule which we have termed a correspondence rule. The relevant rule is:

(15) Italian Correspondence Rule 1 (ICR 1)

> If the prosodic elements (the macrons and breves) can be placed into one-to-one correspondence with the metrical elements (S and W) in such a way that S corresponds to a macron, the line is metrical; otherwise, the line is unmetrical.

It is obvious that, given ICR 1 and the breve/macron output of (11) and (13) assigned by IPFR 1-3, it is a simple matter to provide a match between the breve/macron sequences of the latter and the abstract metrical pattern in (14):

(16) W W W W W W W W W S -- endecasillabo metrical pattern

by ICR 1

output of IPFR 1-3

It is important to note that the procedure just outlined says nothing about the way in which a line is to be recited or read. In particular, it does not imply that the vowels subject to IPFR 3 should be elided or slurred or treated any differently in reading verse than in normal dis-

course. Instead, the procedure outlined must be understood as a sort of computation; i.e. as a test for determining whether or not a given sequence of words is a proper embodiment of the endecasillabo. As we have already seen in (5), this pattern can be embodied in verses containing no more than ten actual syllables, as well as in verses containing as many as fifteen syllables and one can readily find even longer lines.

There are, of course, examples of Italian verse which contain lines which exhibit far fewer than ten syllables. These, however, are not instances of the endecasillabo but rather of meters with fewer abstract metrical entities. For example, the metrical pattern for the so-called settenario is:

(17) W W W W W S

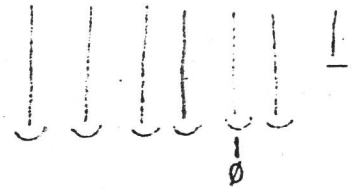
But while the abstract metrical pattern is different, IPFR 1-3 and ICR 1 still apply. To account for verses of this type, then, the only change in the theory in (3) that is required is to substitute one abstract metrical pattern (17) for another (14). The settenario is illustrated in (18):

(18) vedrai ridotto in cénere
il tuo nascente impéro
ignota al passagéro
Cartagine sarà.

(Metastasio)

A scansion of the first line of (18) proceeds as follows:

(19) vedrai ridotto in cénere



by IPFR 1
by IPFR 2
by IPFR 3

output
by ICR 1
metrical pattern

The effects of IPFR 3 have been a special subject for discussion among those who have written on the meter of the Italian verse. In particular, a distinction has been made when IPFR 3 applies across word boundaries and when it applies within words. The former have been termed sinalefe, the latter sineresi. While the normal case is for IPFR 3 to apply (or, in traditional terminology, for sinalefe or sineresi to take place) wherever possible, there are certain instances where IPFR 3 does not apply (or in traditional terms where dialefe or dieresi takes place instead):

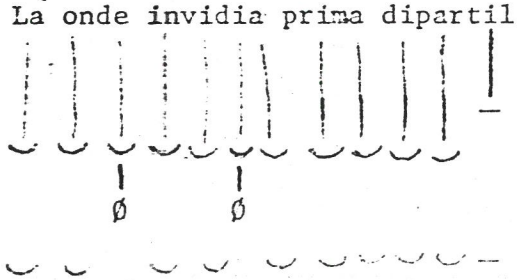
(20) a. Là onde invidia prima dipartilla

b. Così vid'ïo già temer li fanti

(Dante)

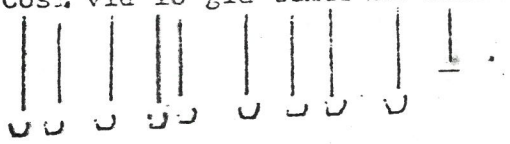
These lines are analyzed by the prosodic filter rules as follows:

(21) a. Là onde invidia prima dipartílla



by IPFR 1
by IPFR 2
by IPFR 3
output

b. Così vid'io già temer li fanti



by IPFR 1
by IPFR 2
output

In (21a) the breve assigned to Là by IPFR 2 is not deleted by IPFR 3. Thus, IPFR 3 is an optional rule which may apply but need not apply in every instance where it is applicable. The same phenomenon is illustrated in (21b). The breve assigned by IPFR 2 to the i in vid'io was not deleted (indeed must not be deleted) by IPFR 3.

In most treatises it is noted that diaresis regularly takes place (i.e. IPFR 3 is regularly prevented from applying) when the vowel sequence includes the last accented vowel in the line. Thus, Elwert (1968) cites the following pair of lines from Tasso's Gerusaleme Liberata:

(22) fosse del sangue empir del popol mío
mío fosse un giorno'eno 'l vorrei già mórto

Where the word mio is subject to diaresis verse-medially but not verse-finally. In terms of the metrical theory proposed here, this treatment is by no means exceptional. Since IPFR 3 deletes only breves, it can not affect the verse final word mio in the first line of (22) since there the i must be assigned a macron by IPFR 1 and hence cannot be affected by IPFR 3. In other words, whereas in the traditional treatment of the endecasillabo the phenomenon under discussion is purely a coincidence to be specifically noted and commented on; in the treatment that has been proposed here, it is a lawful consequence of rules that were independently justified.

The Classical Hexameter

The favorite metrical form for epic verse in classical antiquity was the hexameter; in this form Homer, Vergil, Ovid and many others couched their major efforts. We shall consider here only the implementation of this meter by the major Latin poets. The abstract metrical pattern of the hexameter is as given in (23):

(23) S W S W S W S W S W S W

The prosodic filter rules divide vowels into two types, assigning them either a macron or a breve, just as has been done in the prosodies examined above. The assignment is based upon the phonological environment of a particular vowel as well as its own intrinsic length:

(24) Latin Prosodic Filter Rule 1 (LPFR 1)

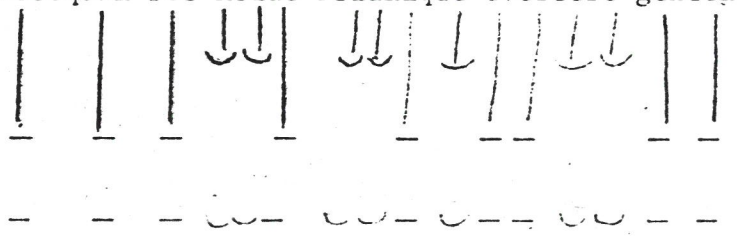
Assign a breve to all short vowels in a line which are followed by no more than a single consonant and a vowel.

Latin Prosodic Filter Rule 2 (LPFR 2)

Assign a macron to all other vowels.

We illustrate the operation of these rules by analyzing the opening line of book iii of Vergil's Aeneid:

(25) Postquam rēs Asiāe Priamīque ēvertere gentem

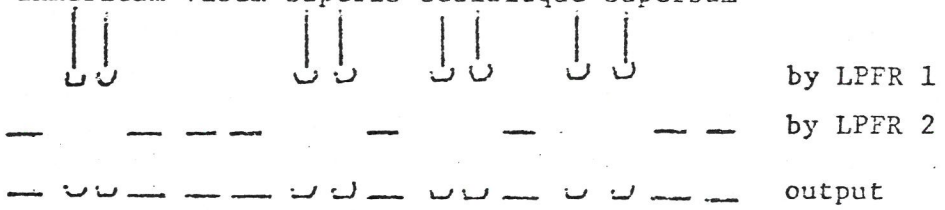


LPFR 1 accounts for the breves assigned to the first two vowels of Asiāe and of Priamīque and to the last two vowels of ēvertere. The

macrons which appear on all other vowels in the line are assigned by LPFR 2.

The second line of book iii of the Aeneid is similarly scanned:

(26) Inmeritam vīsum superīs cedidit̄que superbum



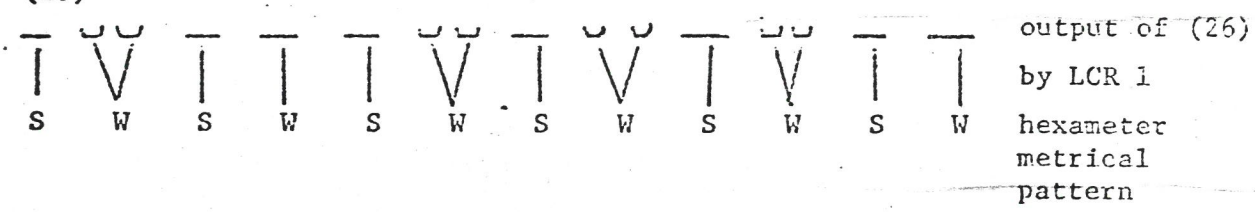
Having scanned these lines a d having the abstract metrical pattern (23) to which the analysis must correspond, we now turn to the correspondence rule to perform the necessary alignment:

(27) Latin Correspondence Rule 1 (LCR 1)

> If the prosodic elements (the macrons and breves) can be placed into correspondence with the S's and W's of the abstract metrical pattern in such a way that each S corresponds to a single macron and each W corresponds either to a sequence of two breves or to a single macron, the line is metrical; otherwise it is unmetrical.

Given (27), we may perform the following match between the output of (26) and the abstract metrical pattern of (23):

(28)



While the output of (26) aligns in accordance with LCR 1, the output of the prosodic filter represented in (25) will not align with the hexameter pattern. A glance at the prosodic element sequence in (25) will show

that there is, in the string of macrons and breves, a single breve surrounded by macrons. However, LCR 1 provides no means whereby a single breve may align with an abstract metrical entity. Only single macrons or sequences of two breves can be aligned.

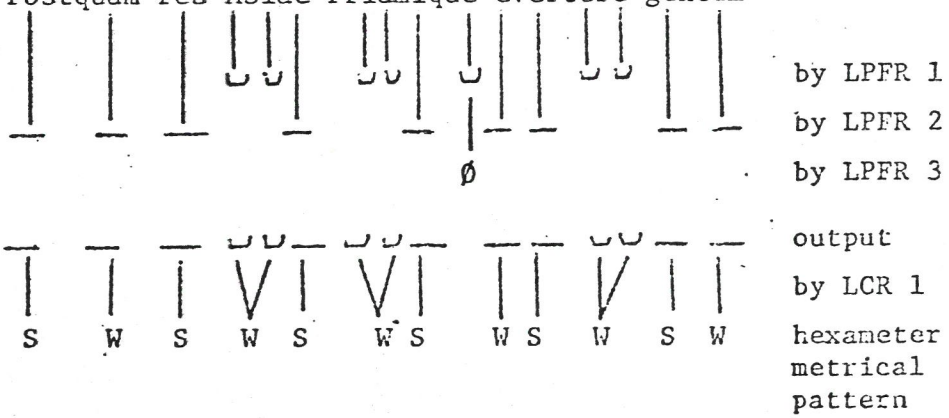
The single breve in (25) is associated in the actual verse line with a vowel which is itself immediately followed by another vowel. The situation is precisely like that encountered in our treatment of the Italian endecasillabo. Indeed, it is possible to make use in the present case of rule (12), which was postulated to deal with the endecasillabo, which we repeat here as (29):

(29) Latin Prosodic Filter Rule 3 (LPFR 3)

Delete a breve if it is assigned to a vowel that directly precedes another vowel (without intervening consonant).

Returning to (25), we may make use of LPFR 3 to delete the single breve and thereby allow LCR 1 to match the output of (25) to the hexameter pattern. This is illustrated in (30):

(30) Postquam rēs Asiāe Priamīque ēvertere gentem



A well known feature of the classical hexameter is that its final foot is never actualized as a dactyl (— ⏑ ⏑), instead, according to

traditional metrists, the final foot is actualized either as a spondee (— —) or as a trochee (— ⏑). To explain why a trochee is allowed in this position, and only there, traditional metrists invoke a special principle of "indifference" (cf. Allen (1966) p. 119). We note that given LPFR 1-2 no special principles or restrictions are needed to account for either of these facts.

According to LPFR 1, only short vowels may be assigned breves and then only when the former are followed by another syllable. This means that the last vowel in a line can never be assigned a breve. Being the last vowel, it does not satisfy the condition imposed by LPFR 1 that it be followed by another syllable. Thus, LPFR 1 never applies to the last vowel, leaving LPFR 2 to assign that vowel a macron. Hence no special comment is required for the last foot of the hexameter. LPFR 1-2 automatically determine that the final S W of the line will correspond to a sequence of two macrons (spondee) and never to a sequence of a macron followed by two breves (dactyl).

The Meter of the French alexandrin

The alexandrin, a meter employed frequently by the major French poets resembles in many ways the classical Italian meters reviewed above. The line of the alexandrin consists of twelve metrical positions with an obligatory boundary (cesura) after the sixth. Since the end of the line always coincides with a word boundary, it is possible to characterize the alexandrin as requiring two obligatory word boundaries: one after the sixth and the other after the twelfth position. We reflect this formally by postulating for the alexandrin the metrical pattern in (31):

(31) W W W W W S W W W W W S

As is well known, in French verse the e-muet, a word-final vowel which is not phonetically actualized in the modern literary language, is counted for metrical purposes under certain conditions, namely, if and only if it is followed in the line by a word beginning with a consonant. These facts are formally expressed in the two prosodic filter rules that follow:

(32) French Prosodic Filter Rule 1 (FPFR 1)

Assign a breve to each vowel in the line including e-muet.

French Prosodic Filter Rule 2 (FPFR 2)

Delete a breve assigned to a word final e-muet, unless it is followed by a word beginning with a consonant.

We still need to account for the fact that word boundaries must obligatorily be found in certain positions of the line, i.e. those labelled S in (31). In order to do this we postulate (33):

(33) French Prosodic Filter Rule 3 (FPFR 3)

Rewrite the last (or only) breve assigned to a word with a macron.

The correspondence rule can now be stated quite simply:

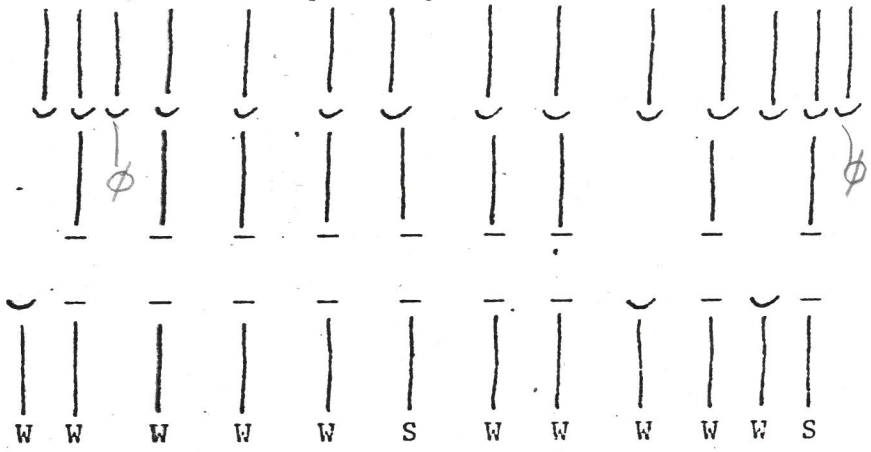
(34) French Correspondence Rule (FCR)

If the prosodic elements (the macron and breves) can be placed into one-one correspondence with the elements (W and S) of the metrical pattern (cf. (31)) in such a way that S always corresponds to a macron, the line is metrical; otherwise, the line is unmetrical.

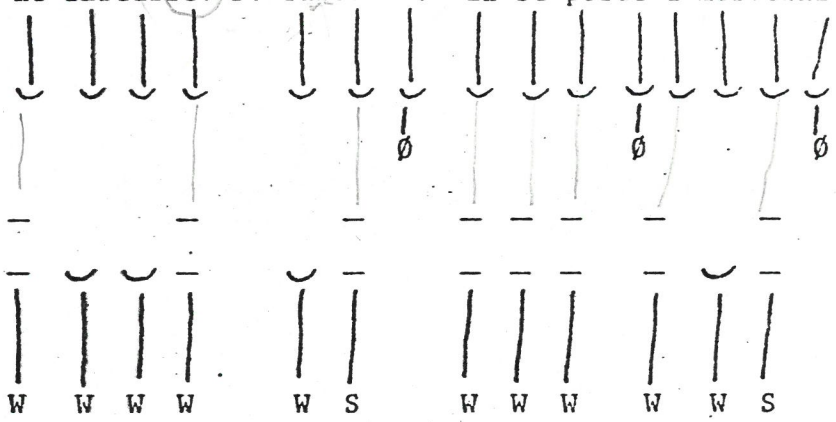
The identity of (34) with the Italian Correspondence Rule (15) is

one of the important features that French poetry shares with that of Italian. Below we illustrate the application of the system of rules just developed to some lines of French poetry.

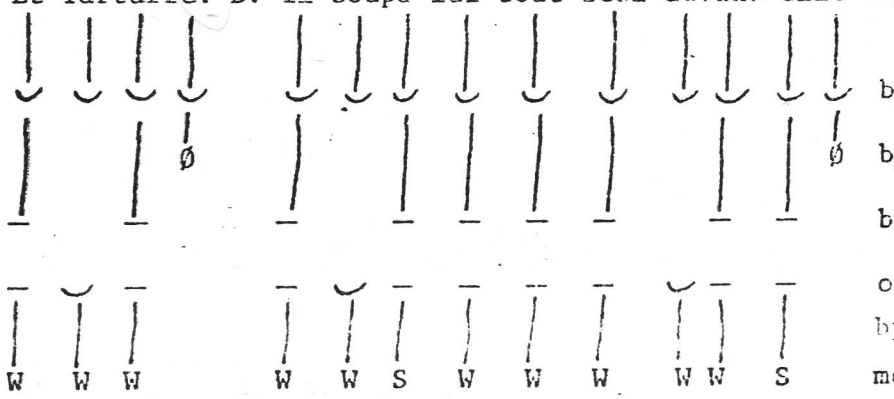
(35) a) Madame, il n'est pas temps de vous troubler encore (Racine, Phedre, 1. 61



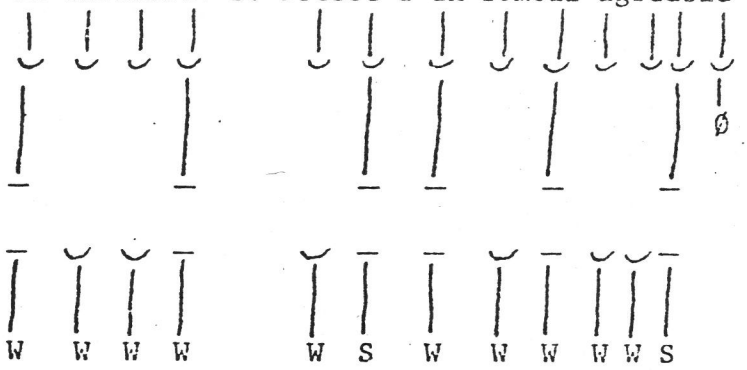
b) O. Et Tartuffe? D. Tartuffe? Il se porte à merveille (Tartuffe, 1. 233)



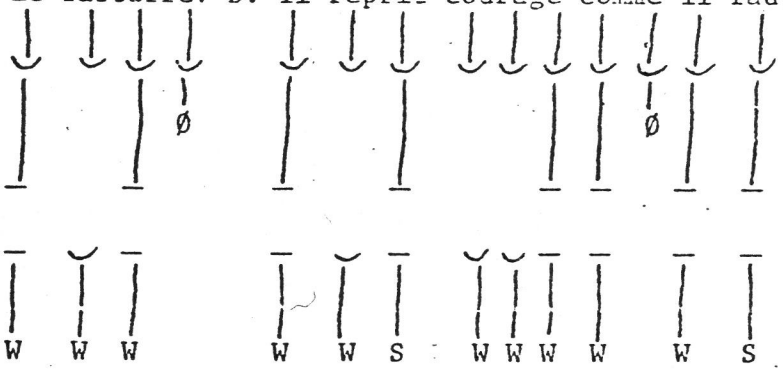
O. Et Tartuffe? D. Il soupa lui tout seul devant elle (Tartuffe, 1. 238)



O. Et Tartuffe? D. Pressé d'un someil agréable (Tartuffe, l. 245)



O. Et Tartuffe? D. Il reprit courage comme il faut (Tartuffe, l. 252)

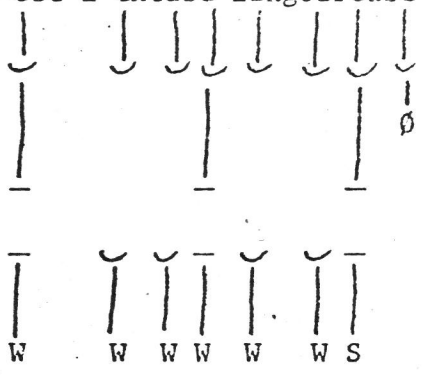


We want to draw special attention to the four lines from the first act of Moliere's Tartuffe quoted in (35b). Because of FPFR 2 the word Tartuffe may count three or two prosodic units depending on whether or not it is followed in the line by a word beginning with a consonant. Moliere obviously played on this fact. In its first occurrence Tartuffe counts three, the second and third time it counts two, the fourth time it counts three, and the fifth and final time it counts two prosodic units. What is especially interesting is that in four out of five cases the next word in the line is spoken by a different character than the one who is uttering the name Tartuffe. This shows rather convincingly, we think, that the manner of counting prosodic units need not be directly related to the way these units are pronounced when the line is recited, because if the pronunciation of the e-muet depended on whether or not the next word in the line begins with a consonant, one would have to assume either that the characters in the scene under discussion possess the magic power of being able to anticipate with what speech sound the response of their interlocutor will begin, or, what is equally implausible, that they can signal their interlocutor whether to begin a response with a consonant-initial or vowel-initial word. That prosody and recitation go their separate ways is as we have already seen, standardly assumed with regard to Italian verse; it should, therefore, be unsurprising that the same is true of French verse as well.

French poets throughout history have employed shorter lines than the alexandrin. These lines have metrical patterns like those of the Italian poets reviewed above: i.e. consisting of any number of W's followed by a single S. The three prosodic filter rules as well as the correspondence rule given above apply here without modification as

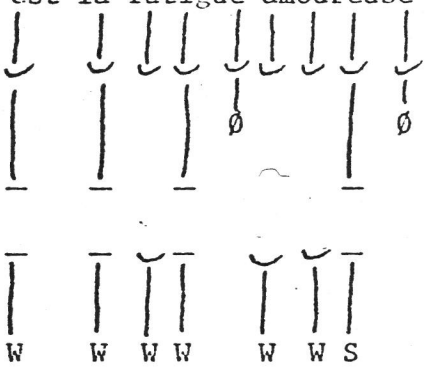
illustrated in the scansions from Verlaine's Ariettes oubliées given below:

(36) a. C'est l'extase langoureuse



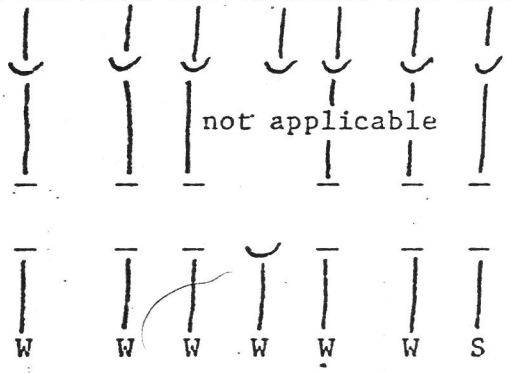
by FPFR 1
by FPFR 2
by FPFR 3
output by FCR 1
metrical pattern

b. C'est la fatigue amoureuse



by FPFR 1
by FPFR 2
by FPFR 3
output by FCR 1
metrical pattern

c. C'est tous les frissons des bois



by FPFR 1
by FPFR 2
by FPFR 3
output by FCR 1
metrical pattern

The Serbo-Croatian Folk Epos

The Serbo-Croatian folk epos is a form of oral poetry that is (or was until recently) actively practiced in rural communities in Yugoslavia. The singers, or guslars (from Serbo-Croatian gusle "fiddle") are highly skilled craftsmen, who not only repeat the traditional epic songs that they have learned from their predecessors, but are also readily able to improvise new epic songs on any appropriate topic. The lines of these new songs conform in their metrical structure exactly to the old traditional songs. This fact is of importance to us here since it provides good evidence that these singers (many of whom were illiterate) have not just memorized a corpus of metrically well-formed lines but rather have mastered a set of principles (or rules) that allow them to compose metrically well-formed lines ad libitum. The knowledge of these principles may be compared to the knowledge that normal humans have of syntax and morphology of their native language. First, the latter is knowledge that is possessed by all normal members of the community, not only those who go to school. Secondly, it allows those who have command of it to produce an unlimited number of well-formed sentences; in particular, sentences that the speakers have demonstrably never heard before. Finally, it is knowledge to which speakers have very little direct access: they usually cannot state the principles that they minutely follow in each utterance, but they are readily aware of gross violations of these (for them, unstatable) principles. And the same is true of the knowledge that folk singers (and most poets, for that matter) have of the metrical structure of their productions.

The meter of the Serbo-Croatian folk epos has been established by Roman Jakobson in a number of influential studies (see bibliography), and

our presentation is primarily a restatement of Jakobson's findings. Extensive collections of texts and much information about the singers can be found in the books by M. Parry and A. B. Lord (see bibliography).

Jakobson notes that Serbo-Croatian epic verse has the following metrical properties:

(36) a. Each line contains ten syllables; i.e., a word boundary occurs after the tenth syllable of the line.

b. A boundary between two "word units" (where proclitics and enclitics belong to the same "word unit" as the word they adjoin) must also occur after the fourth syllable of the line.

c. There is no word boundary after the third and after the ninth syllable in the line; i.e., a polysyllabic "word unit" must end with the fourth and the tenth syllable of the line.

d. Monosyllabic and disyllabic "word units" must begin with odd-numbered syllables in the line and cannot begin with even-numbered syllables.

The above severely limit the freedom with which words can be strung together. Thus, for instance, the first colon in each line, which is four syllables long, may logically be composed of words of the following lengths (we represent a monosyllabic word as U, a disyllabic word as UU, etc.):

(37) a. UUUU b. UUU U c. UU UU d. UU U U

e. U UUU f. U U UU g. U UU U h. U U U U

Of these eight logically possible combinations, five are inadmissible (b,d,f,g,h) because they violate the requirement that monosyllabic and disyllabic words begin only with odd-numbered syllables in the line. In

addition, (b,d,g,h) are ruled out also because they contain a word boundary after the third syllable, where word boundaries are not admitted. Similar restrictions operate in the second colon of the line, so that out of 32 (= 2^5) word type sequences that are logically possible there, all but eight are excluded.

It is obvious from (37 a-c) above that the location of the word final syllable in the line is crucial to the implementation of this meter. It is necessary, therefore, that the word final syllable be distinguished from all other syllables of the word. We achieve this by the following two prosodic filter rules:

(38) a. Serbo-Croatian Prosodic Filter Rule 1 (SCPFR 1)

Assign a macron (—) to the last vowel of a word unit.

b. Serbo-Croatian Prosodic Filter Rule 2 (SCPFR 2)

Assign a breve (⏑) to all other vowels of the line.

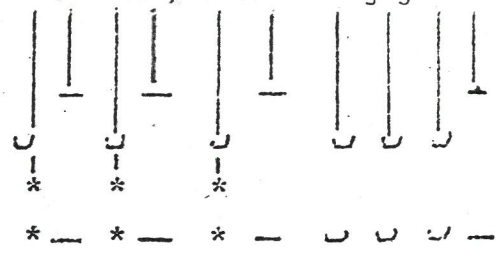
In order to implement constraint (37d) in the list given above the initial (or only) syllable of mono- and di-syllabic words must be distinguished from the other syllables of the line. We achieve this by means of:

(39) Serbo-Croatian Prosodic Filter Rule 3 (SCPFR 3)

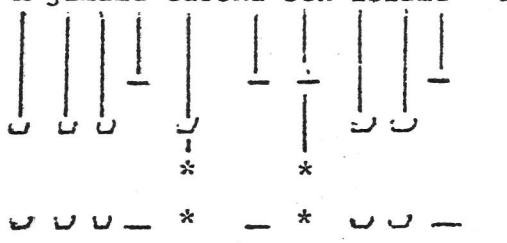
Assign an asterisk (*) to the initial (or only) vowel in mono- and di-syllabic words.

These three rules thus establish representations of the line in terms of three distinct prosodic elements as shown in (40):

(40) a. Kaži rane, sultan Suljejmane "Tell me of that wound, Sultan Sulejman" (PL, II, 260.67)



b. A jimamu carski seh islamu "And the Imperial High Pontiff"



The metrical pattern of the Serbo-Croatian Epic verse is

(41) S W S S W S W S

This meter is mapped onto the sequence of breves, macrons, and asterisks with the help of the following correspondence rule:

(42) Serbo-Croatian Correspondence Rule 1 (SCCR 1)

a. When followed by another S, or at the end of the line, S corresponds to a sequence of two prosodic elements of which the second is a macron.

b. Elsewhere S corresponds to a single prosodic element.

c. W corresponds to a breve or to a macron, but not to an asterisk.

We illustrate this in (43):

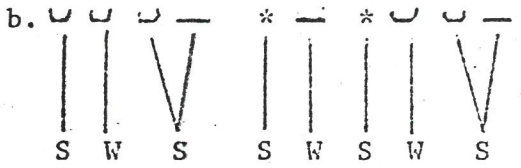
(43) a.

output of SCRFR 1-3 in (40a)

by SCCR 1

metrical pattern

*

b. 

output of SCPFR 1-3 by SCCR 1 metrical pattern

The English Iambic Pentameter

Among the best studied meters of all those reviewed in this survey (see references in bibliography) is the iambic pentameter, a meter in which all of the major poets of the English language have written, from Chaucer through Shakespeare and Milton and Pope to the major poets of the 20th century. Indeed, the meter had become so pervasive by the beginning of this century that Ezra Pound once said that the metrical task of modern poetry was to break the back of the iambic pentameter.

The abstract metrical pattern of the iambic pentameter is quite straightforward:

(44) W S W S W S W S W S

The correspondence rule for the iambic pentameter is also straightforward:

(45) English Correspondence Rule 1 (ECR 1)

If the prosodic elements (macrons and breves) can be placed into one-to-one correspondence with the elements of the metrical pattern (S's and W's) in such a way that each W corresponds to a breve, the line is metrical; otherwise, the line is unmetrical.

What is of special interest in studying this meter is the nature of the prosodic filter. The relevant property of lines with respect to the

filter is the main word stress; that is, the main stress which is automatically assigned to words by virtue of their being members of the lexical categories which are traditionally called "parts of speech". These are nouns, adjectives, adverbs and verbs other than auxiliary verbs like be, have and do and modal verbs like will, can, shall, etc. Prepositions, conjunctions, pronouns, auxiliary and modal verbs and certain adverbial particles like when, where, why and how are, from the point of view of the iambic pentameter, without stress.

Another aspect of stress that is also ignored from the standpoint of iambic pentameter is that of subordination. Though stressed elements are subordinated to one another in all English sentences, the amount or degree of subordination is metrically irrelevant.

In other words, only lexical stress is metrically relevant and, with respect to lexical stress, only two degrees are important; namely, stressed and unstressed. (In the examples which follow stress is indicated by the acute accent over certain vowels, unstress is indicated by the absence of the acute accent.)

The prosodic filter for the iambic pentameter can be represented in terms of stress as follows:

(45) a. English Prosodic Filter 1 (EPFR 1)

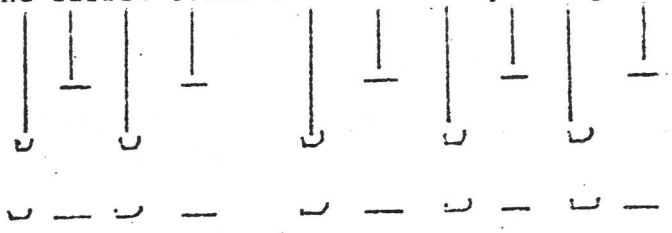
Assign a macron to each vowel with main word stress in the line.

b. English Prosodic Filter Rule 2 (EPFR 2)

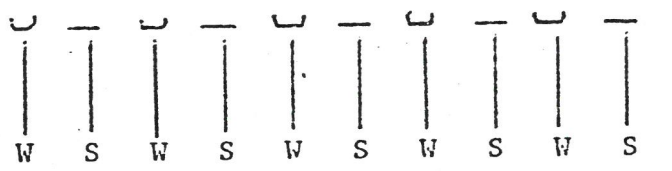
Assign a breve to every other vowel in the line.

The following lines are scanned accordingly:

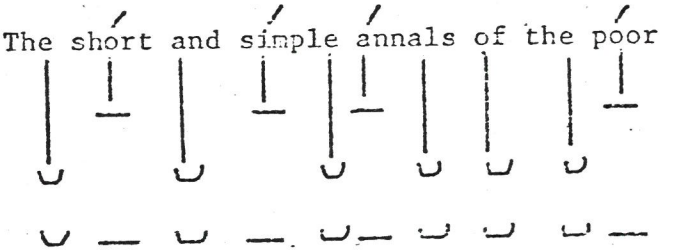
(47) a. The curfew tolls the knell of parting day (Gray)



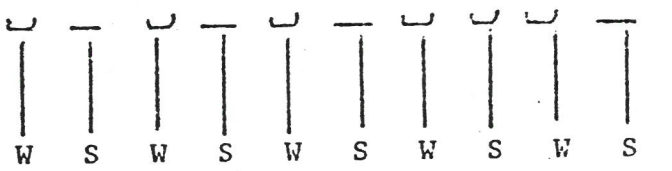
b.



(48) a. The short and simple annals of the poor (Gray)

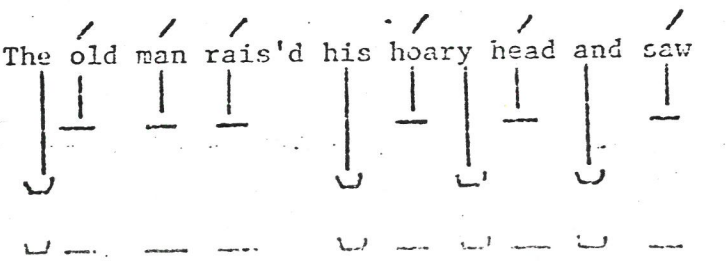


b.



The scansion in (48) shows that an iambic pentameter line may have fewer than five stressed vowels in it and still be metrical. There are lines which contain more than five stressed vowels, however, and these require an addition to the prosodic filter:

(49) The old man rais'd his hoary head and saw (Keats)



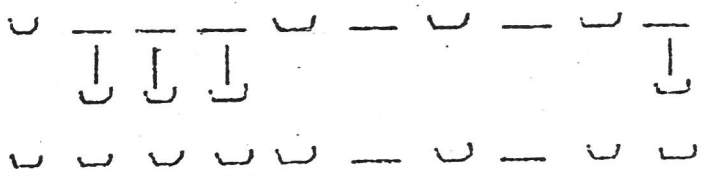
There is no way for the output in (49) to correspond to the abstract metrical pattern for the iambic pentameter. However, such lines abound in this meter. We therefore add the following prosodic filter rule:

(50) English Prosodic Filter Rule 3 (EPFR 3)

Replace a macron by a breve unless surrounded on both sides by breves.

This rule modifies the output of (48) as follows:

(51)

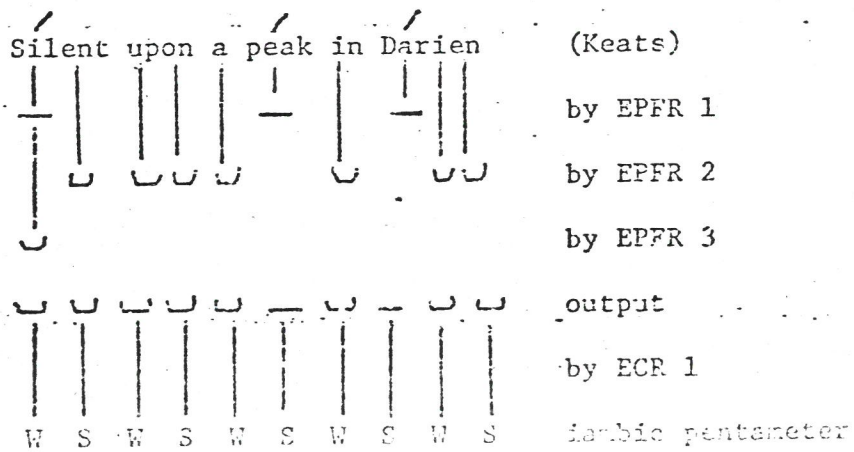


And this new output can now correspond to the iambic pentameter:

(52)

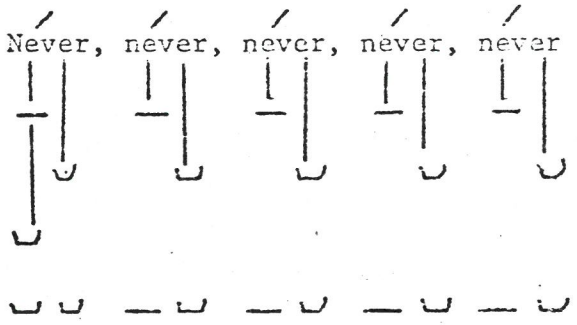
Lines like (53) now scan properly:

(53) Silent upon a peak in Darien (Keats)



A problem still remains with lines like (54):

(54) Never, never, never, never, never (Shakespeare, King Lear)



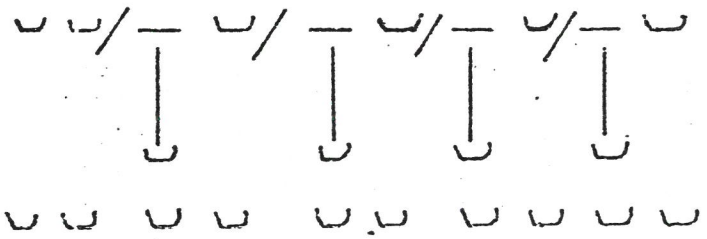
Though complex, lines like (54) are possible lines within the iambic pentameter tradition and the prosodic filter needs further modification to admit them. The crucial aspect of such lines is that the offending macron (corresponding to a W position) is adjacent to a major syntactic break, indicated orthographically by the commas in (54). This property can be taken advantage of by the addition of the following prosodic filter rule:

(55) English Prosodic Filter Rule 4 (EPFR 4)

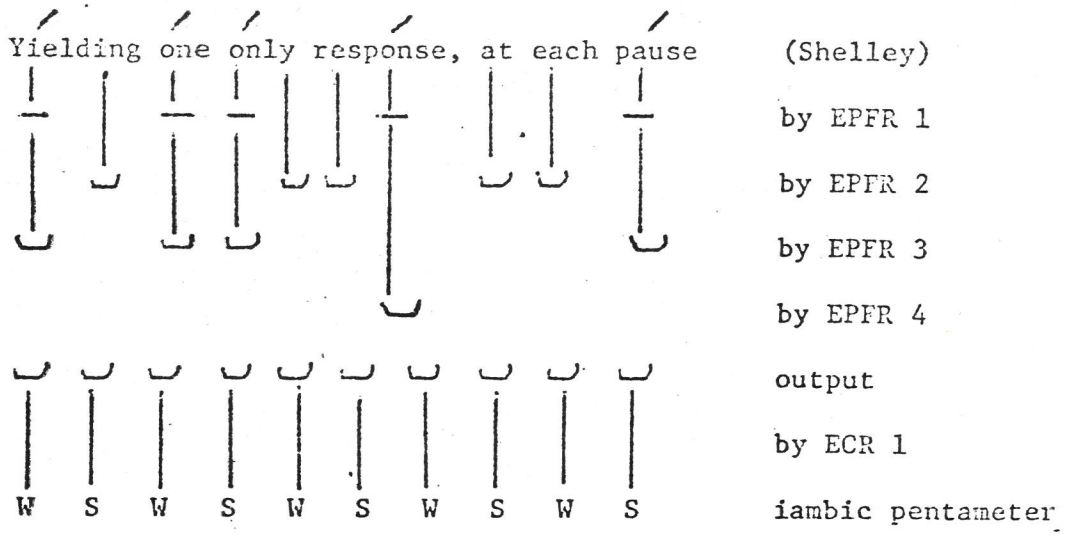
Replace a macron adjacent to a major syntactic break by a breve.

This rule will apply to the output of (54) as follows:

(56)



Now lines like (57) also scan properly:



There is considerable evidence based upon numerous studies, among them those cited in the bibliography, which suggest that poets differ from one another in terms of the specific prosodic filter rules that they employ. The prosodic filter rules discussed above characterize the poetry of Chaucer, large segments of Shakespeare, Dryden, Pope and others. Milton and certain later segments of Shakespeare (most notably his sonnets) and Robert Frost appear to require slightly different prosodic rules. However, this would take us well beyond our present purposes and we turn, instead, to our final metrical system.

The Metrics of Classical Arabic Poetry

The poetic traditions reviewed above employ metrical patterns of limited complexity. Whatever complexity has been encountered above, has been concentrated almost exclusively in the rules of the prosodic filter. There are, however, poetic traditions where the principles underlying the different metrical patterns are considerably more involved than those already discussed. The most interesting among these are the meters of the Arabic qasida, odes written in the pre-Islamic period, whose meters

have been the standards not only for most Arabic poetry but also for a considerable proportion of poetry written in the various local languages in the vast areas extending from Spain to Indonesia that are (or once were) under the political and cultural dominion of Islamic powers.

The theory of the meters of qasida was developed in the eighth century by Al Xalil. This theory which incorporated many deep and correct insights has been the subject of extensive commentaries and exegesis by both Islamic and Western scholars. Unfortunately almost all of the voluminous literature dealing with this theory is practically inaccessible to anyone not thoroughly at home in classical Arabic philology. Partly for this reason, Halle (1966) published a short essay formalizing some of the most important aspects of the theory. Subsequently, the subject was studied more extensively by Joan M. Maling (1973). This work not only provides the interested layman with a manageable introduction to the theory of Arabic meters, but also contains important new results that in various ways extend and improve upon Al Xalil's classical work. This section of our survey is heavily indebted to Maling's study, although it does include a number of additions and departures that seemed to us necessary.

The typical qasida is an ode of between twenty and a hundred lines. Each line consists of two half-lines. Second half-lines always rhyme, and in the first line of the poem only, the two half-lines rhyme as well. The two half-lines that make up a line are metrically identical except for optional shortening the last foot of the second half-line (catalexis). The half-line or H is, therefore, the basic unit of the Arabic meter. According to the native grammarians, the half-line is made up of from two to four feet (ǰuz? pl. aǰza?), which in turn are sequences of abstract

entities called pegs (watid) and cords (sabab). We shall symbolize pegs by the letter P, and cords by the letter K. The basic actualization of the peg is as a sequence of two syllables, of which normally the first must be associated with a breve and the second with a macron (P = ⏑ –). A cord, on the other hand, is actualized commonly by a syllable assigned a single prosodic element without regard to its nature. In fact, the determination of the macron and breve status of syllables follows precisely the same principles stated above for the classical Latin hexameter. We repeat this rule for Arabic as:

(58) a. Arabic Prosodic Filter Rule 1 (APFR 1)

Assign a breve to a short vowel followed by a single consonant followed by a vowel in the next syllable.

b. Arabic Prosodic Filter Rule 2 (APFR 2)

Assign a macron to all other vowels.

It is, of course, a highly remarkable fact that such disparate metrical traditions as those of Homer and the pre-Islamic Arabic bards should utilize the same filter for macron and breve assignment. Whether this indicates a common origin, or reflects a general property of the perception of metrically relevant properties can at this point not be decided.

The classical theory recognizes the 16 meters in (59).

(59) I.	tawīl	PK PKK PK PKK
	basīt	KKP KP KKP KP
	madīd	KPK KP KPK KP
II.	wāfir	PKK PKK PKK
	kāmil	KKP KKP KKP
III.	hazaj	PKK PKK PKK
	rajaz	KKP KKP KKP
	ramal	KPK KPK KPK

IV.	sarīʕ	KKP KKP KKQ
	mansarih	KKP KKQ KKP
	xafīf	KPK KQK KPK
	mudārīʕ	PKK QKK
	muqtadab	KKQ KKP
	mujtaθθ	KQK KPK
V.	mutaqārib	PK PK PK PK
	mutadārik	KP KP KP KP

In (59) the meters are listed in the traditional way, being subdivided into five sets, each of which is called a circle (da'ira). As can be observed at once the circles differ in the number of pegs. The meters in circles I and V contain four pegs, and shall, therefore, be referred to as tetrameters; those in circles II and III contain three pegs (trimeters); whereas those in IV contain either three or two pegs. We shall consider the meters in IV as containing fundamentally only two pegs and refer to these meters, therefore, as dimeters.

The basic rule for generating metrical patterns of Arabic verse is:

(60) Arabic Metrical Rule 1 (AMR 1)

A half-line, H, is composed of the basic sequence PKK repeated n times, where n = 2,3,4.

Given AMR 1 it is readily seen that the meters of circle IV will be generated (in part) by letting n = 2; those of II and III, by letting n = 3; and those of circles I and V, by letting n = 4. It is, of course, obvious that the strings generated by AMR 1 fail to represent the entire set of actual meters illustrated in (59). In order to do this we shall subject the strings generated to a number of other metrical rules.

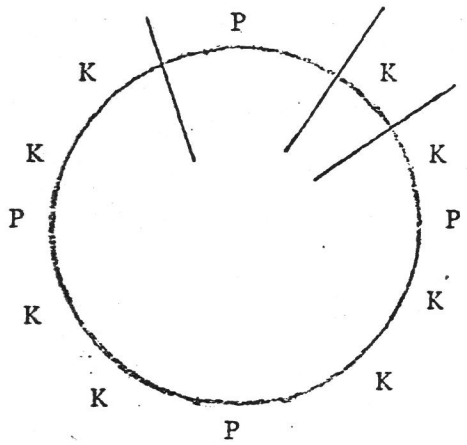
Consider first the meters of circle III (i.e., n = 3). AMR 1 gives the correct sequence of entities for the first of the meters listed, hazaj. We observe that the three meters in circle III can be generated one from another by what mathematicians call cyclic permutation; i.e., a

procedure that places the first unit in a sequence at its end:

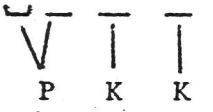
(61) P K K P K K P K K → K K P K K P K K P → K P K K P K K P K

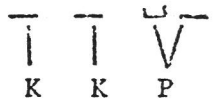
This fact was the fundamental insight underlying Al Xalil's proposal that the meters should be represented by circles, where each meter can begin at any point in the circle as shown in (62).

(62)



Given cyclic permutation as a metrical rule, we readily obtain the three meters in circle III. It is essential to observe that what is being permuted is a peg or cord, and not a "short" or "long" syllable, or a macron or a breve: e.g. ⏑ – – – will be permuted to – – ⏑ – and not ⏑ – – – to – – – ⏑.





The tetrameters are represented by the meters in circles V and I. In order to characterize these meters we must first introduce the foot boundary #. We shall postulate that after cyclical permutation has taken place, the metrical rule in (63) applies.

(63) Arabic Metrical Rule 2 (AMR 2)

Foot boundary # is introduced after and before every third unit in the meter.

AMR 2 will take sequences of metrical elements like:

(64) a. PKK PKK PKK PKK

b. KKP KKP KKP KKP

c. KPK KPK KPK KPK

and insert # as shown:

(65) a. # PKK# PKK# PKK# PKK#

b. # KKP# KKP# KKP# KKP#

c. # KPK# KPK# KPK# KPK#

We are now ready to state the metrical rule that will generate the meter in circles V and I. To get the meters in circle V we require the metrical rule in (66):

(66) Arabic Metrical Rule 3 (AMR 3)

K is deleted next to a foot boundary, or next to a P preceding a foot boundary.

AMR 3 will modify the metrical sequences in (67) to yield those of circle V:

(67) a. # PKK# PKK# PKK# PKK#

Ø Ø Ø Ø by AMR 3

PK # PK # PK # PK # mutaqarib

b. # KKP# KKP# KKP# KKP#

Ø Ø Ø Ø by AMR 3

K P# K P# K P# K P# mutadarik

(Note that mutadarik is also derivable from (65c).)

To obtain the meters in circle I we make use of the same rule, but restrict it so that AMR 3 applies only in odd-numbered feet if the meter begins with a peg, and only in even-numbered feet if the meter begins with a cord. Thus from (65) circle I is derived as follows:

(68) a. # PKK# PKK# PKK# PKK#

Ø Ø by AMR 3.

PK # PKK# PK # PKK# tawil

b. # KKP# KKP# KKP# KKP#

Ø Ø by AMR 3

KKP# K P# KKP# K P# basit

c. # KPK# KPK# KPK# KPK#

Ø Ø by AMR 3

KPK# KP # KPK# KP # madid

The inelegance of the condition on AMR 3 required to derive circle I meters might raise questions about the validity of the rule. These questions seem to us to be answered by the fact that the same rule with yet another special condition accounts also for one of the major metrical differences between half-lines. (See our discussion below.)

The most complicated situation arises with respect to the meters in circle IV. It will be observed that in each of the meters given in

the table (59) we find a Q in place of one P. The Q represents a special kind of peg, which is actualized by a macron followed by a breve (Q = —⏑). We recall at this point that the principle for determining the prosodic element representation of syllables in Arabic verse is identical to that for Latin; i.e. a syllable is assigned a breve if it consists of a short vowel followed by a single consonant which in turn is followed by another vowel (cf. APFR 1-2 above). This means that any syllable appearing in verse final position is by definition assigned a macron. It follows from this that a metrical pattern ending with a Q which as we have just noted, must be implemented by a macron followed by a breve, can, in principle, never be realized. In fact, Maling, who investigated this matter in considerable detail, concludes that "there appear to be no clear examples of a line-final short syllable, and hence no unambiguous examples of a line-final trochaic peg. Therefore, we can consider the meters traditionally classified as sari? to be new submeters of rajaz (circle III - MH/SJK) without complicating the rest of the system in any way." (p. 52)

This leaves five meters in circle IV to be accounted for. It will be recalled that we suggested that all meters in this circle are fundamentally dimeters, consisting of two feet. We now return to the observation made above that in each of the meters in circle IV there appears in place of one P an entity Q; i.e., in place of the normal iambic peg we have there a trochaic peg. In order to capture this fact we postulate:

(69) Arabic Metrical Rule 4 (AMR 4)

In the meters of circle IV, i.e., in all and only dimeters, replace one noninitial P by Q.

It can readily be seen that this will locate a Q correctly in the three

dimeters under discussion:

(70) a. # PKK# PKK#

Q by AMR 4

PKK# QKK# mudari

b. # KKP# KKP#

Q by AMR 4

KKQ# KKP# muqtadab

c. # KPK# KPK#

Q by AMR 4

KQK# KPK# mujta

The only gap in the picture are the two remaining meters of circle IV, munsariḥ and xafīf which are, in fact, trimeters instead of dimeters. To achieve these we postulate one more metrical rule:

(71) Arabic Metrical Rule 5 (AMR 5)

Insert a copy of the first foot after the last foot in meters where Q would otherwise appear in verse final or verse pre-final position.

We illustrate the operation of the Arabic Metrical Rules by deriving the metrical patterns of the munsariḥ and xafīf.

(72) Input: PKK PKK PKK PKK by AMR 1

KKP KKP KKP KKP by cyclic permutation

KPK KPK by cyclic permutation

# KKP# KKP#	# KPK# KPK#	by AMR 2
# KKP# KKQ#	# KPK# KQK#	by AMR 4
# KKP# KKQ# KKP#	# KPK# KQK# KPK#	by AMR 5

The traditional metrical treatises contain extensive discussions of "deviations" from the patterns generated by the rules discussed thus far. Of these there are two types: zihāfāt, which may affect any foot in the half verse, and ʿilal, which may affect only the last foot in the half-line. Maling has shown that the overwhelming majority of the latter "deviations" concern the precise conditions under which a particular metrical entity may be actualized by a specific sequence of macrons and breves; these belong, therefore, properly among the correspondence rules. A subset of the ʿilal rules which are restricted to the final foot of the half verse, do affect the metrical structure of the line. Maling shows that these ʿilal rules can be subsumed under the principle that the last cord in the foot may optionally be deleted. It will be recalled that such a rule already exists in our theory; namely, AMR 3. Hence to incorporate these ʿilal rules all that is required at this point is to add to AMR 3 the condition that it may optionally apply to the last foot of the half verse in any meter. This provides independent support for this rule.

As shown in (72) , in order to obtain the metrical pattern of the half-lines of a given poem it is necessary to select one of the three values of n in AMR 1 and then apply those among the metrical rules that hold for the pattern selected. This pattern is then related to the output of the prosodic filter by means of the following correspondence rule (73):

(73) If the prosodic elements (macrons and breves) can be placed into correspondence with the P, Q, and K of the abstract metrical pattern so that

i) P corresponds to a sequence of breve-macron, or, optionally in verse-final foot, to a macron;

ii) Q corresponds to a sequence of macron-breve, or, optionally in verse-final foot, to a macron;

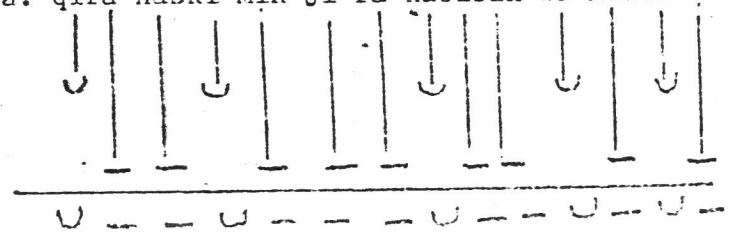
iii) K corresponds to a single prosodic element, or, optionally in trimeters, to a sequence of two breves, provided that K precedes another K in the same foot;

then the line is metrical; otherwise it is unmetrical.

We note that the trimeter option (73) is available only in the meters hazaj (PKK) and rajaz (KKP) but not to ramal (KPK), for the latter has no KK sequence in a given foot. It is through the application of (73) that we obtain the meters of circle II from the three meters of circle III. Thus, unlike traditional Arabic metrists, we attribute the distinction between circle II and circle III not to a difference in metrical pattern but rather to the utilization of a special correspondence rule. (A more detailed discussion of these correspondence rules, as well as of the need for several additions and refinements, can be found in Maling's monograph.)

To conclude this part of our discussion we illustrate below scansions in two different meters:

(74) a. qifā nabki min ʿi rā habībin wa manzili

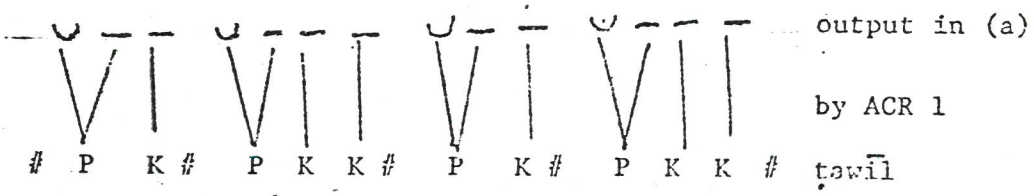


"Halt, you two, and let us weep for the memory of a beloved and an abode."

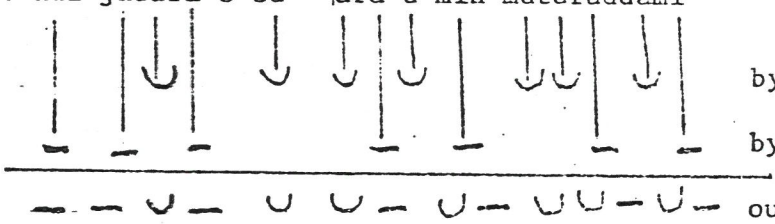
b. Generation of tawil meter

PKK PKK PKK PKK	by AMR 4 (n = 4)
(no applications)	cyclic permutations
# PKK# PKK# PKK# PKK#	by AMR 2
Ø Ø	by AMR 3
# PK # PKK# PK # PKK#	tawīl

c. Comparison of output in (a) with meter in (b)



(75) a. hal jādara s-su ʿarā'u min mutaraddami

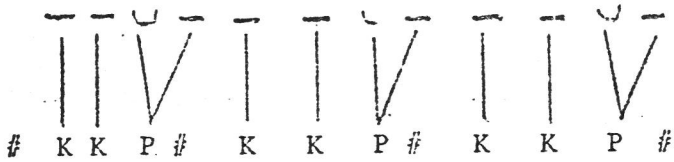


"Have the poets deserted a place which needs to be patched."

b. Generation of the rajaz meter

PKK PKK PKK	by AMR 1 (n = 3)
KKP KKP KKP	by cyclic permutation
# KKP# KKP# KKP#	by AMR 2
# KKP# KKP# KKP#	rajaz

c. Comparison of output in (a) with meter in (b)



output in (a) by ACR 1 rajaz

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