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The tonal system of Chinese regulated verse

ABSTRACT

At least three distinct approaches to the analysis of Chinese regulated verse have appeared in the literature of the past half century: linear, metrical tree, and metrical grid.

Wang Li (1957), Downer and Graham (1963), T'sou (1968), and Jakobson (1970) have all offered linear accounts of this verse, and all of these accounts have been argued to be inadequate in Chen (1979).

Chen gives the second approach: he applies generative theories of meter that were developed in more recent years and comes up with a tree analysis that has received wide acclaim (as in Graham [1980]; Yip [1980a; 1980b]; Xue [1989]).

While some linguists have offered explicit criticisms of varying parts of Chen's analysis (such as Liu [1980]; Schlepp [1980b]), others have offered evidence that goes counter to certain details of Chen's analysis without citing Chen's work (Boyce [1980]; Cheung [1980]; Ripley [1980]). But only two works that I know of have offered entire alternative analyses to Chen's. One is the linear analysis in Lorentz (1980); the other is the metrical grid analysis in Napoli (1989).

In this paper I argue that no single approach, whether linear, arboreal, I or grid, is adequate to account for all aspects of Chinese regulated verse.

Instead, an arboreal approach best accounts for the rhythmic pattern and a linear approach best accounts for the tonal pattern.

I first present Chen's arboreal analysis in detail. Then I briefly present certain modifications on Chen's analysis proposed in Yip (l980b) and Xue (1989). A critical look at the arboreal analysis brings to light its strengths with respect to the rhythmic system and weaknesses with respect to the tonal system.

Next I present Napoli's grid analysis for the tonal system, followed by a critical evaluation and comparison with the arboreal analysis.

Finally I offer a linear account of the tonal system as a complement to Chen's arboreal account of the rhythmic system.

1. CHEN'S ANALYSIS

Chen gives the following tonal schemes for Chinese regulated verse.

(1) Tonal Schemes of Chinese Regulated Verse

Heptasyllabic A   Pentasyllabic A
1. v v - - - v v   1. - - - v v
2. - - v v v - -   First   2. v v v - -
3. - - v v - - v   Quatrain   3. v v - - v
4. v v - - v v -   4. - - v v -

5. v v - - - v v   5. - - - v v
6. - - v v v - -   Second   6. v v v - -
7. - - v v - - v   Quatrain   7. v v - - v
8. v v - - v v -   8. - - v v -

Heptasyllabic B   Pentasyllabic B
1. - - v v - - v   1. v v - - v
2. v v - - v v -   First   2. - - v v -
3. v v - - - v v   Quatrain   3. - - - v v
4. - - v v v - -   4. v v v - -

5. - - v v - - v   5. v v - - v
6. v v - - v v -   Second   6. - - v v -
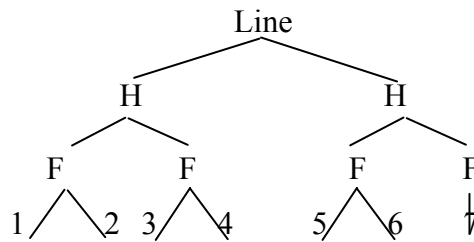7. v v - - - v v   Quatrain   7. - - - v v
8. - - v v v - -   8. v v v - -

Here "v" symbolizes an oblique tone, which has a rising and/or falling contour, "-" symbolizes an even tone, which has a steady-state pitch throughout the syllable.

Chen then notes two immediate facts that any analysis must account for. First, the second quatrain in all four types of verse is identical to the first quatrain. Second, the pentasyllabic verse is identical to the last five positions in the corresponding heptasyllabic verse.
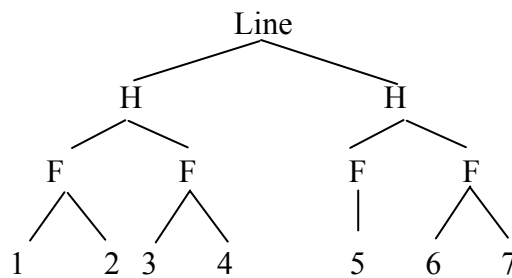
Chen proposes the tree analysis below, where the tree has unmistakable similarities to Kiparsky's (1977) tree for iambic pentameter.

First, consider heptasyllabic verse. Chen says that if we look at the line as made up of two hemistiches, where each contains two feet and one of the two feet of the second hemistich contains only one position, whereas all other feet contain two positions, we will come up with two basic trees.

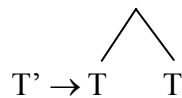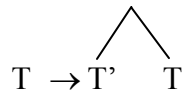(2) Line with left-branching (i.e., final foot has only one position)

(3) Line with right-branching (i.e., penultimate foot has only one position)

Now let us look at the right-branching structure, letting all sister constituents down to the level of the metrical foot have opposite tones assigned to them in this fashion:

(4)

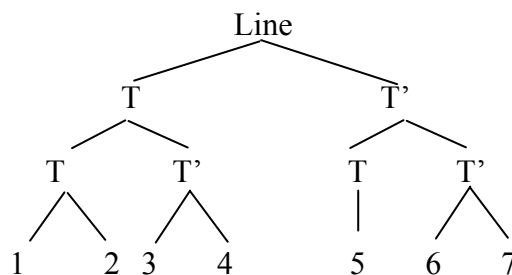$$T \rightarrow T' \quad T$$

$$T' \rightarrow T \quad T'$$
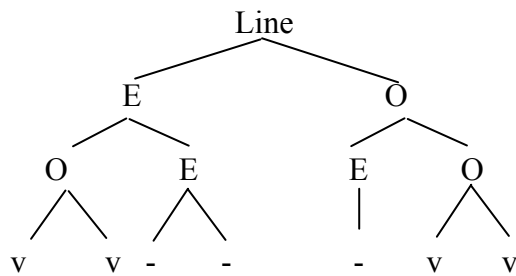
Here T'= the opposite tonal specification from T.

We will arbitrarily start with a line in which the hemistiches are arranged with T first.

(5)

Taking this tree, if we let T = even, then T' = oblique. The tree with tone specified will be:
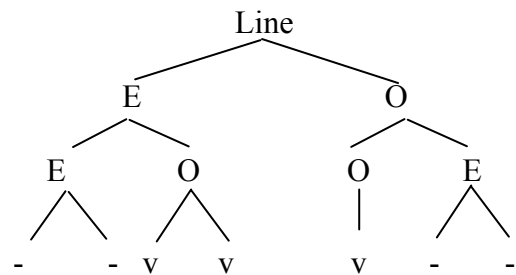
(6)

```
                          Line
                   ┌────────┴────────┐
                   E                  O
              ┌────┴────┐        ┌────┴────┐
              O         E        E         O
             ╱ ╲       ╱ ╲       │        ╱ ╲
            v   v     -   -       -      v   v
```

This is, in fact, the pattern we find for line 1 of Heptasyllabic A verse.

If, on the other hand, we let T = oblique, then T' = even. The tree with tone specified will be:

(7)

```
                          Line
                   ┌────────┴────────┐
                   E                  O
              ┌────┴────┐        ┌────┴────┐
              E         O        O         E
             ╱ ╲       ╱ ╲       │        ╱ ╲
            -   -     v   v       v      -   -
```

This is, in fact, the pattern we find for line 2 of Heptasvllahic A verse.

On the other hand, if we look at the left-branching structure in 2 and fill in our Ts and T's, and if we set T = even, we find the following outcome:

(8) vv - - - -v

And if we set T = oblique, we find:

(9) - -vvvv

Neither of these two patterns is found in verse, however. Chen accounts for this with his tonotactic condition:

(10) Tree Tonotactic Condition: If Tone Assignment produces four consecutive syllables carrying an identical tone, the tones of the second half-line undergo alpha-switching (E to O, and vice-versa).

The tonotactic condition will apply always and only to a left-branching structure, since these are the only structures that can (and must) yield four consecutive syllables bearing the same tone. The tonotactic condition will convert 8 into:

(11) v v - - v v -

And the tonotactic condition will convert 9 into:

(12) - - v v - - v

But now we see that 12 is, in fact, the pattern we find for line 3 of Heptasyllabic A verse and 11 is the pattern we find for line 4 of Heptasyllabic A verse.

Let me summarize the findings thus far. There are two parameters involved: whether a structure is right or left branching, and whether we set T to equal even or oblique. With the given values for these parameters, we generate all the lines of the first quatrain of Heptasyllabic A verse in this way, with the implementation of the tonotactic condition:

(13) R, E →line l
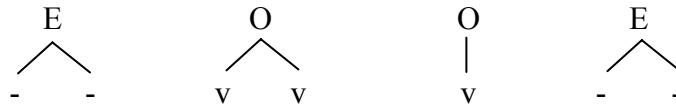
   R, O →line 2

   L, O →line 3 (tonotactic condition applied)

   L, E →line 4 (tonotactic condition applied)

Chen notes that the sequencing of lines is such that each line differs from the one immediately preceding it by only a single parameter. Furthermore, the changing parameter varies from being the R/L branching one to being the E/O tone one with each line. That means that if we start with R, E and we vary the tone parameter, we'll get R, O. From there we have no choice; our next line must be L, O. And we are led from that without choice to the next line being L, E. At this point, if we were to go to a fifth line, we would vary the branching parameter and keep the tone stable. But then we would get R, E. And that is precisely the values we had for line 1, as well. In fact, it now follows that the second quatrain's tonal schema must be identical to the first quatrain's, merely by virtue of our rules for line sequencing. Thus Chen has accounted not only for the pattern of each line in Heptasyllabic A verse, but also for the fact that the tonal schema of the second quatrain is identical to that of the first quatrain.
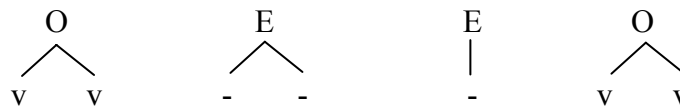
Notice that in 5 above we arbitrarily started with the hemistiches being marked as T and T'. If, on the other hand, we started with the hemistiches being marked as T' and T, we would have the foot pattern of T T' T' T. Then if we consider the right-branching structure where T = E, we'll have:

(14)

```
        E            O            O            E
       / \          / \           |          / \
      -   -        v   v          v         -   -
```

This is the pattern for line 4 of Heptasyllabic B verse. And if we take the right-branching structure where T = O, we'll have:

(15)

```
        O            E            E            O
       / \          / \           |          / \
      v   v        -   -          -         v   v
```
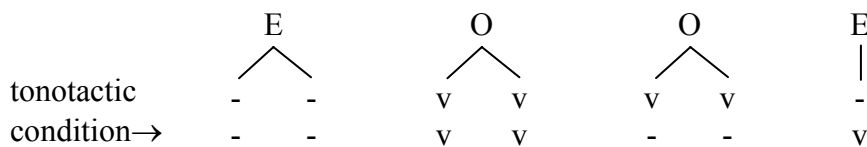
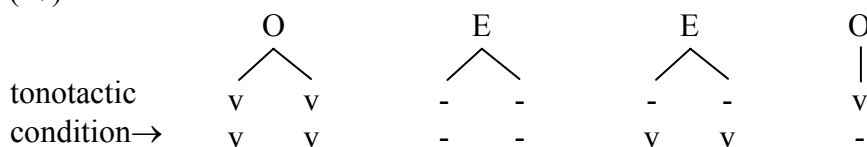This is the pattern for line 3 of Heptasyllabic B verse.

Now let us keep our hemistiches marked as T' followed by T and look at the left-branching structure. Of course, now we will run into strings to which the tonotactic condition will apply. If we set T = E, we'll have:

(16)

```
                    E            O            O            E
                   / \          / \          / \           |
tonotactic        -   -        v   v        v   v          -
condition→        -   -        v   v        -   -          v
```

This is the pattern for line 1 of Heptasyllabic B verse. Now let T = O, and we get:

(17)

```
                    O            E            E            O
                   / \          / \          / \           |
tonotactic        v   v        -   -        -   -          v
condition→        v   v        -   -        v   v          -
```

This is the pattern for line 2 of Heptasyllabic B verse.

The four lines of Heptasyllabic B verse have now been generated, and when we line them up, characterizing them by the two relevant parameters of branching and tone assignment, we find:

(18) L, E   →   line 1 (tonotactic condition applied)

   L, O → line 2 (tonotactic condition applied)
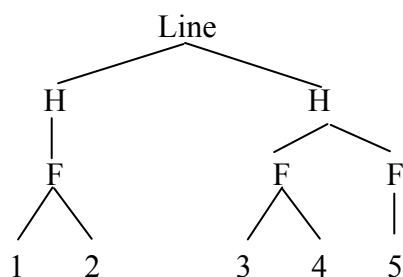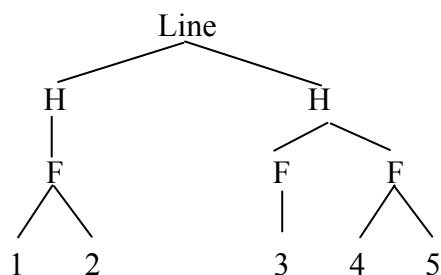
   R, O → line 3

   R, E → line 4

Again we can see that line sequencing involves changing only one parameter each line, where that parameter must alternate each line between branching and tone assignment. And, as we saw above for Heptasyllabic A verse, the next line after line 4 should have the parameter setting L, E, which is the parameter setting for line 1. So, again, the tonal schema of the second quatrain will duplicate that of the first quatrain.

Chen then turns to pentasyllabic verse and notes that if we adopt a tree in which there are two hemistiches, where the second hemistich has all the same possibilities as the second hemistich of heptasyllabic verse, but the first hemistich has only one foot with two positions to that foot, we will he able to generate all the lines of Pentasyllabic A and B verse. The tree will be as in:
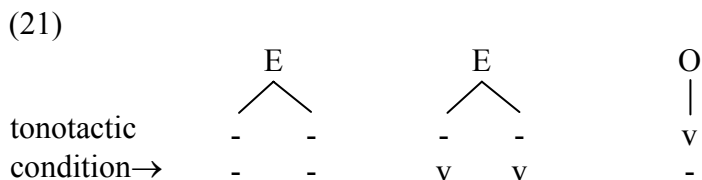

(19) Left-branching:
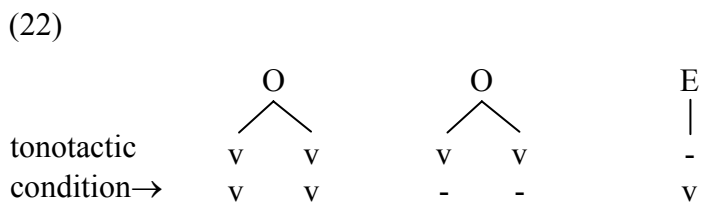

(20) Right-branching:

Note that if a T on one metrical level dominates only a single node on the next metrical level, that node is also a T. But if a T on one level dominates two nodes on the next metrical level, those two nodes are T' and T. The result is that, since the first hemistich of (19-20) contains only one F,

that F will match in tone assignment the second foot of the heptasyllabic verse. Thus we have now seen an account of why pentasyllabic verse is identical to heptasyllabic verse, minus the first foot.

If we set the first H to be T, then the second H will be T'. Now if we take a left branching structure with T = E, we'll get:

(21)

		E			E			O
tonotactic	-	-	-	-	v
condition→	-	-	v	v	-

This is line 4 of Pentasyllahic A verse. If we change T to O, we find:

(22)

		O			O			E
tonotactic	v	v	v	v	-
condition→	v	v	-	-	v

This is line 3 of Pentasyllabic A verse.

The reader can go on to show that if we look at a right branching structure and set T = E, we'll produce line 1 of Pentasyllabic A verse. And if we set T = O, we'll produce line 2 of Pentasyllabic A verse.

Now if we start with the first hemistich being T', then if we look at a left-branching structure and set T = E, after application of the tonotactic condition we'll get line 1 of Pentasyllabic B verse. If we change T to O, after the tonotactic condition, we'll get line 2 of Pentsyllabic B verse. When we switch to the right-branching structure and set T = E, we find line 4 of Pentasyllabic B verse. And if we let T = O, we find line 3 of Pentasyllabic B verse.

Once more all of the lines of pentasyllabic verse are accounted for with a single tree, where we vary the parameters of tone assignment and branching and where we can have the first hemistich be T or T'. And once more, the line sequencing will involve varying the two parameters in precisely the same way we did for heptasyllabic verse.

Chen goes on to talk about variations on these patterns and the rhyme schema. For now we will end this part of the discussion and return to the matter of tonal variation in section 6 below and to the rhyme schema in sections 4 and 5 below.

2. TONE LABELING

An obvious weak point of Chen's otherwise elegant analysis is his tonotactic condition in 10 above. It is ad hoc and unlike any other mechanism I have seen in the metrical literature. Chen himself seems not totally comfortable with the tonotactic condition. He raises an alternative analysis in which direct tone labeling of the nodes in a tree eliminates the need for the tonotactic condition. The alternative he discusses is (400):

(23) Given sister nodes [N_1, N_2], N_1 is labeled T if it branches, otherwise N_1 is assigned T'. N_2 always takes the opposite label to that of N_1.

Chen rejects this alternative because it generates unacceptable lines in pentasyllabic verse.

Yip (1980a; 1980b), however, argues against the tonotactic condition and for two tone labeling conventions: one for heptasyllabic verse (the same convention Chen rejected in [23] above), and another for pentasyllabic verse (where her convention for pentasyllabic verse labels N_2 [rather than N_1] as T if it branches).

Xue (1989) agrees with Yip that the tonotactic condition is to be avoided and that tone labeling of nodes is the correct way to do that. However, he points out that positing difference tone labeling conventions for pentasyllabic and heptasyllabic verse is missing the generalization that pentasyllabic verse looks like heptasyllabic verse minute the first foot. He offers the following labeling convention:

(24) In a pair of sister nodes [N_1 N_2], N_1 is labeled T' if it branches, otherwise N_2 is labeled T'.

This labeling convention works equally as well for heptasyllabic and pentasyllabic verse.

While analyses like Yip's and Xue's do not call for a tonotactic condition (and, therefore, may be considered superior to Chen's), they make use of the tree hierarchy, both in the assignment of tones and in the rules for line sequencing. For this reason I limit my discussion below to only Chen's version of the arboreal analysis, where my criticisms hold equally of Yip's and Xue's analyses.

3. EVALUATION OF THE ARBOREAL ANALYSIS

The contention of this section is that Chen's arboreal analysis is most useful for the rhythmic system but not for the tonal system of Chinese regulated verse. Three types of data are discussed below: recitation rhythms, syntactic patterns, and the sameness of adjacent tones.

3.1. Recitation rhythms

Perhaps the key factor that has been taken as support for Chen's arboreal analysis has not yet been mentioned in this paper: the recitation rhythm.

Many have noted that Chinese regulated verse is recited with an iambic (or agogic) rhythm. Yip (1980a) points out that the first hemistich is purely iambic, while the second hemistich allows for three separate rhythms, all of which she shows can be accommodated by the tree analysis.

Yip's arguments are convincing: the recitation rhythms are best accounted for with a tree analysis that incorporates iambic feet. However, there are several reasons to doubt that the same structural analysis which handles recitation rhythms is responsible for tonal patterns.

First, tonal poetry has a long and complex history within China (and if Mair – Mei [1991] are correct, this history goes back to India). The earliest anthology of Chinese Poetry is the Book of Odes in which lines consisted of four syllables and were sung or chanted in an iambic rhythm (Yeh [1974]). During the Han Dynasty (approximately 200 B.C. to 200 A.D.) the pentasyllabic line developed and it, as well, was sung or chanted in the iambic rhythm, either one-two, one-two, one, as in Wang Wan's *Passing Mount Beigu* :

kè lù qīng shān xìa
a traveling road below the mountain green

xíng zhōu lü shuǐ ían
a gliding boat before the emerald stream

or one-two, one-two-three, as in Du Fu's *Spring Prospect*:

gǎn shí huā jiàn leì
moved by the season, blossoms spatter tears

hèn bíe nǐao jīng xīn
saddened by separation, birds stir the soul

(Both examples are taken from Yeh [1974]). During the sixth century pentasyllabic tonal (or regulated) verse emerged from the literary salons of the Southern dynasties (Mair – Mei [1991]) and was chanted (no longer sung) in the iambic rhythm. When the heptasyllabic line developed later, it also was chanted in the iambic rhythm. In fact, Yeh (1974) attributes the fact that the six-syllable line, which arose around the same time as the heptasyllabic line, never gained widespread popularity to the fact that the iambic chanting rhythm made lines with an even number of syllables too monotonous and inflexible. Iambic recitation held not just for shi forms of poetry, but other verse forms, as well, including *ci* and *qu* (Yeh [1974]). As Hua – Lee (1986) discuss, methods of chanting were passed on generation after generation. And as Yeh (1974) states, the reciter's (or chanter's) emotional interpretation and reaction to the poem can affect the tone of the poem, but not its rhythm. If the chanter feels that the rhythm conflicts somehow with the meaning or other structure of the poem, the rhythm prevails. For example, in Ou-yang Hsiu's *Second Time to Ru-yin* the first three syllables of the following two lines, being noun phrases ('yellow oriole' and 'dark red cherries') form a semantic and syntactic unit. Yet these lines are recited with an iambic rhythm, breaking up the noun phrases.

huáng lí líu míng sāng zhēn meǐ
yellow oriole sings, and mulberry trees look fine

zǐ yīng táo shú maì fēng liáng
dark red cherries ripe, breeze over wheat feels cool

(This example is taken from Yeh [1974]). The iambic convention, then, is strong. Today the iambic rhythm is used generally in the recitation of Chinese poetry, whether it is tonal verse or not (Boyce [1980]). What we can see from all this discussion is that the recitation rhythm of poetry in China is iambic, independently of the tonal system. Furthermore, according to Xue (1971), «…there seems to be a tendency for Chinese words to go by two, with the second one receiving more stress» (477). In other words, the linguistic rhythm is itself leaning toward the iambic. If this is so, it would be a mistake to build the iambic rhythm into the tonal system of Chinese regulated verse. Rather, the rhythmic system is independent of the type of verse, and offers no evidence as to the proper analysis of the tonal system.

Second, according to Mei (1970), the earliest poets of tonal poetry «apparently operated with four prosodic categories, that is, four tones. Later there are only two. The process of change may have been gradual or sudden» (108). Chen's tree is a binary system which could not accommodate a metrics that distinguished between four tones. If we are to assume that the present tonal system of

regulated verse derived from the four-tone system by the simple process of conflating the three non-level tones and that other aspects of the tonal system remained constant, then the present tonal system should not be analyzed with a mechanism that allows for binary distinctions. Of course, it is possible that the change from a four-tone to a two-tone (*ping* and *ze*) system was the result of the imposition of a totally new tonal system -- in which case an arboreal system is conceivable. But there is no evidence in any of the literature I have read to suggest such a radical change, and Mei himself does not know whether the process was gradual or sudden. (Certainly, if the process was gradual, conflation is the most likely account. But if the process was sudden, either conflation or the imposition of a totally new tonal system is possible).

Third, a close look at Chen's trees (for example, the tree in [5] above) reveals the fact that both hemistiches and feet are marked with T or T'. Graham (1980) carries Chen's system further, marking whole lines and quatrains with T or T'.I echo Lorentz's (1980) confusion here: «...it is not quite clear to me what it would mean for a hemistich to carry an even or oblique word tone» (92). Likewise, it is not clear what it would mean to mark whole lines and quatrains with T or T'. And, going in the other direction, it is not clear what it would mean to mark feet with T or T'. Traditionally nodes in trees are labeled with the symbols W and S, representing relative rhythmic strength (duration or stress). This relative rhythmic strength has its counterpart at the syllable, foot, and hemistich levels. However, tones are defined on lexical items. There is no obvious sense in which anything other than a lexical item can carry a tone. Here again, Chen's arboreal analysis looks natural for the rhythmic system but not for the tonal system.

In sum, while an iambic (WS) tree is called for to account for the recitation rhythm of all Chinese verse, an iambic tree is inappropriate as a model for the tonal system of Chinese regulated verse.

3.2. Syntactic evidence

There are two types of syntactic data offered as evidence for the metrical structure of Chinese regulated verse. First, Chen (1980), building on work by R. Cheng (1968; 1973) and C.-C. Cheng (1970), points out that data in Boyce (1980) on tone sandhi in Min show that rhythm forces sandhi where the syntax would not allow it and blocks sandhi where the syntax would allow it (an example of Yeh's 1974 contention that rhythm prevails over structure, already exemplified above). Chen notes that these breaks are points where his tree structure shows breaks. However, even Chen does not connect this fact directly to the tonal system. Instead he concludes that «rhythm overrides syntax in determining the scope of tone sandhi» (25). Once more, by Chen's own reckoning, it is the

rhythm, not the tone, that is at issue here. And once more we see that the evidence speaks for an iambic tree for the rhythmic system only.

Second, Chen (1979; 1980) argues that various instances of unusual word order (or hyperbaton) in Chinese regulated verse are motivated by «the tendency toward a metrico-syntactic match» (1980, 15). Two types of criticisms that I know of have been leveled against Chen's argument for a metrico-syntactic match. One is a challenge of the accuracy of identifying hyperbaton, where the unusual word order may simply be the best word order for what the poet wants to say regardless of metrics (see Liu [1980]). The other is a challenge of whether or not the hyperbaton acts to improve the metrico-syntactic match (see Schlepp [1980b]).

Here I will not pursue these criticisms. Instead, let me assume that Chen's data are accurately labeled hyperbaton and that the change in word order improves the metrico-syntactic match. Even in that case, however, his evidence supports a tendency toward a rhythmic-syntactic match, rather than a tonal-syntactic match. That is, the syntactic data Chen brings up are, in fact, irrelevant to the analysis of the tonal system of Chinese regulated verse if the tonal system is not confounded with the rhythmic system.

Furthermore, Chen's syntactic evidence supports the proposal of a clear break after the fourth syllable of heptasyllabic verse and after the second syllable of pentasyllabic verse, but nowhere else. That is, his data speak to the existence of hemistiches, not of feet. In fact, while Chen (1979) argues that both foot splitting and foot straddling occur and create varying degrees of metrical tension, Schlepp (1980b) counterargues that it is precisely the existence and unpredictability of the distribution of foot splitting and foot straddling that offer evidence against the very existence of feet, questioning Chen's consistency of standards in his analysis. And Schlepp (165, building on work in Liu Dabai [1930]) further disputes the proposal of a match between syntax and meter, claiming that there are pauses in positions that should be mid-foot within the second hemistich in Chen's analysis.

The only conclusion I can reach, then, is that if the syntactic facts are relevant to the tonal system, they suggest a breakdown into hemistiches, but no smaller units are called for. In fact, that is exactly the proposal that I pursue below. Notice that if the syntactic subsystem and the rhythmic subsystem of the metrics of Chinese regulated verse break the line into hemistiches, then one might expect that all subsystems would do the same, in particular, the tonal system. Napoli (1989), who offers a grid approach to the tonal system, finds clear benefits in a hemistich analysis, as shown in section 4 below. And the linear account in section 5 builds directly on Napoli (1989).

3.3. Pairs of adjacent tones

One piece of evidence based on the tones themselves (and not on rhythm) has been of-fered for the existence of the foot in the tonal system, and that is the fact that if all elements in a foot receive the same tone, we can account for the fact that pairs of adjacent syllables receive the same tone generally (with the complication of the fact that the second hemistich would con-tain a defective foot of only one syllable).

Lorentz (1980), however, points out that pairs of adjacent syllables receive the same tone generally even if we look at vertical adjacency, rather than horizontal adjacency. That is, looking back at (1), we see that, while the second line of each poem is maximally different from the first, if we consider the columns of syllables in each octet, we see a strong tendency toward adjacent sylla-bles pairing together and receiving the same tone. (There are, again, complications – just as there are in looking at horizontal pairs. But the general tendency is clear).

Lorentz's point is well-taken, and one would want an analysis of the tonal system in which the tone matching of both vertical and horizontal adjacent pairs would follow from a single parameter. In Chen's analysis, it does not: the tone matching of horizontal pairs follows from the fact that they both belong to a single foot; but the tone matching of vertical pairs follows from the line sequencing rules, which are determined by the factors of whether the second hemistich branches to the right or left and whether we set T to equal even or oblique (see section 1 above.) In sections 4 and 7, we will see analyses that do account for both horizontal and vertical tone pairing with a single parame-ter, and neither of these analyses uses the foot. The proposal of the foot, then, is not a perspicacious way of accounting for the tone matching of all the relevant pairs of syllables.

3.4. Section conclusion

The arboreal analysis of Chen is a useful representation of the rhythmic system but not of the tonal system. This is not a surprising result, given that there is no a priori reason to expect tonal sys-tems and rhythmic systems to be identical (Schlepp [1980a; 1980b]; Lorentz [1980]).

There are, however, strengths in Chen's analysis regarding the tonal system which any com-peting analysis should strive to maintain.

First, Chen relates the sequence of lines in a quatrain and the very fact that the tonal schema of the second quatrain is identical to that of the first quatrain to parameters of the formation of the line. While the particular parameters Chen uses relate to his proposed tree structure, it is possible to step away from the tree and consider just the theoretical proposal that line sequencing is determined by parameters of line formation. This is an exquisite insight that replaces a variety of complex and ad hoc mechanisms needed in the linear accounts cited above (including the most recent one by

Lorentz [1980], as well as the earlier accounts argued against in Chen [1979]). Second, Chen gives evidence for the hemistich as a basic unit in both the syntactic system and the rhythmic system (as discussed in section 3.2 above). It will he seen below that this is a fundamental insight into the metrics of Chinese regulated verse and that the proposal of the hemistich in the tonal system allows for substantial efficiency in the competing analyses in sections 4 and 5 below.

Third, Chen has derived pentasyllabic verse from heptasyllabic verse by elimination of the first foot, thereby accounting for the identity of the last five positions in those two types of verse. There is one major flaw in this part of Chen's analysis, however, and that is that pentasyllabic tonal verse cannot historically be derived from heptasyllabic verse since pentasyllabic verse preceded heptasyllabic verse by hundreds of years.

Thus, the generation of one verse form from the other (which is an elegant way of accounting for the similarities in the two verse forms) should go in the direction of generating heptasyllabic verse from pentasyllabic verse (as I will do in section 7 below).

These three features of Chen's analysis are incorporated in Napoli's (1989) grid analysis and will be incorporated into the linear analysis in section 7 below (where we find the improvement of the change in direction in generation of verse forms, with heptasyllabic deriving from pentasyllabic).

4. METRICAL GRIDS

Napoli (1989) offers a grid analysis of the tonal system of Chinese regulated verse. She assumes without argument that the recitation rhythm is to be accounted for by a separate mechanism, just as I have argued in section 3 above. She uses Chen's proposal that Chinese regulated verse consists of hemistiches (which, of course, both Yip and Xue also use, but which no linear account I know of uses) and has all lines derive from a single formula for generating a hemistich grid, with rules that allow deletion of grid columns and other rules that filter out certain hemistich combinations.

One may be surprised at the very proposal of a grid analysis for a tonal system, since placement on grid levels other than the lowest reflects relative prominence and typically the grid is used to show relative rhythmic prominence. However, there is nothing to prevent us from allowing the grid (or the tree, for that matter) to reflect other types of prominence. A tonal grid, then, is theoretically possible, and it should show tonal prominence. Napoli proposes that every tone get a place on the lowest level of the grid, but only O (oblique) tones get a place on the second level of the grid. With this proposal she claims that there is a sense in which an O tone is more prominent tonally than an E tone.

This proposal seems reasonable, for, as Chen (1979) says, «While the exact phonetic nature of these tonal categories cannot be fully ascertained (see, however, Mei [1970]; Pulleyblank [1978]), it is generally understood that the E tone had a steady-state pitch throughout the syllable, whereas the O tones exhibited a rising and/or falling contour» (372). So Napoli's proposal amounts to claiming that a composite tone is more prominent tonally than a simple tone.

This claim has no direct implications about the rhythmic structure of verse. In fact, throughout the history of Chinese regulated verse, E syllables were typically used to transcribe long vowels, while O syllables were used to transcribe short vowels (Polivanov [1924]; Zhou [1948]), and vowel length was correlated to the heavy/light distinction in syllabic weight. So if we were to assign relative prominence to E and O syllables on a rhythmic grid, we might well take the E syllable as more prominent. Once more we see that tonal systems and rhythmic systems are distinct and not necessarily isomorphic or even related to each other in any predictable way.

Napoli begins by laying out the observed grid patterns for hemistiches.

Starting with heptasyllabic verse, the first hemistich consists of four tones.

The grid patterns we find are:

(25) x x   lines 1 & 4 of Hepta. A
                            lines 2 & 3 of Hepta. B
      x x x x

(26)   x x   lines 2 & 3 of Hepta. A
                            lines 1 & 4 of Hepta. B
      x x x x

Grid construction for the first hemistich is then:

(27) Hemistich 1: Level one has four positions.

     Tone Addition: Add two consecutive positions to level two at one end or the other.

We see that Tone Addition is an end-dominant rule, characteristic of grid rules in general.

The second hemistich consists of three tones. The grid patterns we find are:

(28)   x x   line 1 of Hepta. A
                           line 3 of Hepta. B
      x x x

(29)   x   line 2 of Hepta. A
                           line 4 of Hepta. B
      x x x

(30)   x   line 3 of Hepta. A

                              line 1 of Hepta. B
            x x x

(31)   x x   line 4 of Hepta. A
                          line 2 of Hepta. B
            x x x

We can see that the two hemistiches are similar. The difference is that the second hemistich is missing a grid column at one end or the other. In order to capture this generalization, Napoli proposes the following formation rule for hemistich 2:

(32) Hemistich 2: Delete one column from either end of hemistich 1.

The next thing to consider is the rules for putting a first hemistich together with a second to form a line (recall that the fact that not all hemistich combinations work led Chen [1979] to the proposal of his unfortunate tonotactic condition.) Since there are two possible grids for the first hemistich and four possible grids for the second hemistich, we can produce eight possible different lines. However, only four of these are actually found in verse (the symbol "/" on level one marks the boundary between hemistiches).

(33) 25 + 28   x x   x x   line 1 of Hepta. A
                                          line 3 of Hepta. B
                x x x x / x x x

(34) 25 + 29   x x   x   not found
                x x x x / x x x

(35) 25 + 30   x x   x   not found
                x x x x / x x x

(36) 25+ 31   x x   x x   line 4 of Hepta. A
                                          line 2 of Hepta. B
                x x x x / x x x

(37) 26+ 28   x x   x x   not found
                x x x x / x x x

(38) 26 + 29   x x   x   line 2 of Hepta. A
                                          line 4 of Hepta. B
                x x x x / x x x

(39) 26 + 30   x x   x   line 3 of Hepta. A
                                     line 1 of Hepta. B

x x x x / x x x

(40) 26 + 31   x x   x x   not found
                 x x x x / x x x

We can see that all the lines of Heptasyllabic A and B verse are generated in this way. But four lines not found in verse are also generated. Of these four, we expect the lack of (35) and (40), given Chen's tonotactic condition. And one might be led at first to adopt a corresponding filter on grid formation that blocks lines with four consecutive like tones. This filter would have a certain naturalness to it; it could be viewed as an anti-clash or anti-lapse mechanism, again something typical of grids in general (Selkirk [1984]).

Napoli, however, rejects such a filter because it will not block the produced but unattested (34) and (37). If a single filter is responsible for the lack of (35), (40), and (34), (37), Napoli reasons, we must conclude that despite the apparent naturalness of a grid tonotactic filter as an anti-clash or anti-lapse mechanism, the true filter is really of a different nature. Napoli compares the good lines with all the lines which must be filtered out and sees this pattern: a whole line is good only if the second hemistich begins with a column that is like one of the columns that flanks it and unlike the other. That is, the start of the second hemistich may neither draw too much attention to itself (by being different from both of its flanking columns) nor be completely unacknowledged (by being like both its flanking columns).

She proposes (41):

(41) Grid Tonotactic Filter: If putting two hemistiches together will result in the second hemistich beginning with a column that is like or unlike both of its flanking columns, the line is rejected.

With this filter we are able to generate all and only the good lines of Heptasyllabic A and B.

Napoli now faces the two questions of why the second quatrain in all four types of verse is identical to the first and why the pentasyllabic verse is identical to the last five positions in the corresponding heptasyllabic verse.

The second question is more quickly answered. Let the grid formation rule for hemistich 1 for pentasyllabic verse be:

(42) Hemistich 1 for pentasyllabic verse: Delete the first two columns from hemistich 1 of heptasyllabic verse.

The rules for formation of hemistich 2 for pentasyllabic verse are identical to those for formation of hemistich 2 for heptasyllabic verse since the set of possible hemistich 2's in pentasyllabic verse is identical to the set of possible hemistich 2's in heptasyllabic verse. In both, hemistich 2 is formed via deletion of the first or last column from hemistich 1 of heptasyllabic verse. That is, 33 holds for both heptasyllabic and pentasyllabic verse.

At this point the tonotactic filter in (41) above will allow us to produce all and only the good lines of pentasyllabic verse in the following way. Our hemistich 1's are:

(43)   and   x x
        x x   x x

Our hemistich 2's are:

(44)   x   and x x   and   x   and x x
     x x x   x x x   x x x   x x x

Putting them together into whole lines we produce:

(45)   x   rejected by grid tonotactic filter
    x x / x x x

           x x   line 4 of Penta. A
                       line 2 of Penta. B
    x x / x x x

             x   rejected by grid tonotactic filter
    x x / x x x

           x x   line 1 of Penta. A
                       line 3 of Penta. B
    x x / x x x

    x x   x   line 2 of Penta. A
                       line 4 of Penta. B
    x x / x x x

    x x x x   rejected by grid tonotactic filter
    x x/x x x

    x x   x   line 3 of Penta. A
                       line 1 of Penta. B
    x x / x x x

```
        x x      x x              rejected by grid tonotactic filter
        x x / x x x
```

In sum, all Chinese regulated verse is formed off a single base pattern, that for hemistich 1 in heptasyllabic verse, given in (27) above. Hemistich 1 of pentasyllabic verse and hemistich 2 of both types of verse are merely truncated forms of this base pattern.

Napoli next addresses the question of why the second quatrain in all four types of verse is identical to the first. Like Chen, she looks to the rules for line sequencing for an answer.

Let us begin with heptasyllabic verse. There are two parameters for characterizing grids in the surface. One is whether the filled positions on the second level appear at the Left end or at the Right end (L/R) of the hemistich. The other is whether the second hemistich has one or two filled positions on the second level. She marks this parameter as -/+, where stands for less than maximum (i.e., 1) and + stands for maximum (i.e., 2) number of possible filled positions on level two. For the first hemistich the only relevant parameter is L/R.

The pattern we find for Heptasyllabic A verse is:

```
(46)    H1      H2
        L       R +
        R       L -
        R       R -
        L       L +
```

The pattern for Heptasyllabic B is:

```
(47)    H1      H2
        R       R -
        L       L +
        L       R +
        R       L -
```

We find an interesting pattern here. If we consider (46) and (47) as two matrices with 4 rows each and 3 columns each, we find that the first column and third columns exhibit a nested pattern, while the middle column exhibits a regularly alternating pattern. That is, the second hemistich changes from one line to the next as to whether the second level has filled positions at the R or the L end. But the first hemistich changes only every two lines, and the alternation of whether the second hemistich has one or two filled positions at the second level occurs only every two lines. That

means that if all three values across the top row change from a given line to the next, then only the middle value will change from the next line to the one after it. But then all three values will change again, like so (using Heptasyllabic A for an example):

(48)   L   R +

          R   L -

          R   R -

          L   L +

The next line we expect, then, will have only the middle column changed, like so:

(49)   L   R +

But now we are back to the pattern for line 1 again. So the second quatrain will be identical to the first quatrain. This line sequencing accounts for both types of heptasyllabic verse.

In this line sequencing we can see a principle emerging: the second and fourth lines will he maximally different (different in all three columns) from the first and third lines, respectively. But the third line will be minimally different from the second. This principle is implicit or explicit in virtually every analysis of Chinese regulated verse that I know of. Chen (1979), for example, builds this in via the changing of the E/O parameter.

There is some evidence independent of tone per say that this principle is correct. Chen discusses the fact that only lines ending in an even tone can rhyme. For Napoli that means that only lines whose second hemistich is marked L (whether + or -) can rhyme. It also means that typically rhyme is limited to the second and fourth lines of the quatrain. However, sometimes rhyme is found in the first line. In those instances, the typical pattern of the first line of the quatrain is replaced with a pattern having a second hemistich marked L. There are, of course, two such line patterns: those of the line 2 and line 4. Given the principle that we have seen above, that the first and second lines of the quatrain should be maximally different, we would expect the pattern of line 4 rather than the pattern of line 2 to be substituted in for line 1. This is exactly what happens (Chen [1979, 393]).

Actually, there is a slight difference between Chen's handling of this fact and Napoli's that makes an interesting prediction. With the grid analysis, the substitution of the pattern of line 4 in place of line 1 is predicted by the explicit statement that lines 1 and 2 must be maximally different. But with a tree analysis, Chen has to add the condition (that is not invoked anywhere else) that «no two adjacent lines may be identical» (1979, 393). Yet, Chen's own condition may be empirically inadequate, since once we substitute the pattern of line 4 for line 1 in the second quatrain of a verse, then the fourth and fifth lines of the entire poem will have identical tonal schema. The only way

Chen's condition could be adequate would be if rhyme were allowed only in the first line of the first quatrain and never in the first line of the second quatrain. But there is no such restriction in Chinese regulated verse. Thus, in the following poem by Shen Yue (as translated by Mather [1988, 79]), both lines 1 and 5 share the rhyme:

"The Embroidery of Her Collar" ("Ling Bian Xiu" 領邊繡)

Slender hands have fashioned
    something new and wonderful:
The needlework is wrought in
    loveable designs.
The curving silk forms flying
    swallowtails.
While knotted threads are seated
    flower children.
Soundless, still they seem to
    move and play;
Without a wind, the branches
    wave themselves.
If such a voluptuous beauty
    doesn't fade,
The collar will receive her
    cloud locks as they fall.

纖手製新奇
刺作可憐儀
縈絲飛鳳子
結縷坐花兒
不聲如動吹
無風自颺枝
麗色儻未歇
聊承雲鬢垂

Let us return now to the discussion of line sequencing, taking up pentasyllabic verse, where there are once more two parameters. But now only the + (maximum, equaling 2 again) versus -(less than maximum, equaling 0 in pentasyllabic verse) parameter is relevant for the first hemistich. And both +/ and R/L are relevant for the second hemistich. The pattern for Pentasyllabic A is:

(50)   -   R +
         +   L -
         +   R -
         -       L +

The pattern for Pentasyllabic B is:

(51)   +   R -
         -       L +
         -       R+
         +   L -

Once more the line sequencing rules work, where the middle variable always changes from one line to the next, but the outer variables change only every other line. Again, line sequencing predicts that the second quatrain in pentasyllabic verse will be identical to the first. And, finally, the second and fourth lines are maximally different from the first and third, whereas the third is minimally different from the second.

5. COMPARISON OF THE GRID AND TREE ANALYSES

There are many ways in which Napoli's analysis is comparable to Chen's, and certainly both can account for all the data on the tonal patterns that are presented thus far in this paper. Here I will focus on the differences between the two analyses, giving an evaluation of each difference.

First, with the grid approach, Napoli must truncate either one column (for the second hemistich of either type of verse) or two columns (for the first hemistich of pentasyllabic verse) from the basic hemistich in order to generate all the possible hemistiches of Chinese regulated verse. With the tree approach, Chen dropped a foot from the first hemistich of pentasyllabic verse, but saw the second hemistich of both types of verse as containing one ordinary foot and one defective foot of only one syllable. In this way, the grid approach allows us to view short hemistiches (hemistiches with fewer than four syllables) as being generated by a single type of process (grid column truncation), whereas Chen's approach cannot capture this generalization.

While one would certainly prefer an analysis that captures generalizations, this particular point brings to light serious questions about the appropriateness of the grid as a model for the tonal system. Nowhere else in the literature on metrical grids do I know of any proposal for truncation of grid columns. Truncation, instead, is typical of linear analyses. Furthermore, while proposals have been made to delete (or add) grid marks on a given level under certain conditions, I know of no proposal for deleting (or adding) more than a single grid mark at once. In general, arboreal and grid theories of metrics aim for manipulation of single units, and in the grid adjacent columns do not form a unit. Thus we would want an analysis that captures the generalization that all hemistiches are derived from a single basic hemistich formation rule with or without truncation, but the grid does not look like the proper mechanism to capture this generalization and the tree is incapable here. A better analysis of the tonal system is needed.

Another point that comes out from this discussion is that both analyses need to make reference to the unit of two positions. Chen does this via the existence of a foot. Napoli does this by truncating two columns. She also has a rule of Tone Addition in (27) which adds two consecutive positions to level two of the grid. While Chen's reference to this unit is principled and Napoli's is

arbitrary, there are other reasons to reject Chen's proposal. But it is clear that any adequate account of Chinese regulated verse will need to see two positions as the basic unit.

Second, recall that the established rhyme pattern places rhyme on lines 2 and 4. We can now see an advantage of the grid analysis. Notice that the first hemistiches of line 1 of a quatrain in all the various kinds of verse (heptasyllabic and pentasyllabic, A and B) represent all the possible first hemistiches allowed in Chinese regulated verse (that is, all the possibilities generated by [27] and [42]). The second hemistiches of line 1, however, are restricted: whether marked + or - , they must be marked with the parameter R. But every line with a second hemistich marked with the parameter R will end in an oblique tone. The generalization is obvious: the first lines are restricted by their final syllable: it must be an oblique tone. And this generalization follows from the rhyme pattern plus the rule sequencing principle that states that line 1 and line 2 must be maximally different. That is, if line 2 bears rhyme, then line 2 will have the second hemistich marked by parameter L. But, then, line 1 must have the second hemistich marked by the parameter R, since it must be maximally different from line 2.

With a tree analysis, on the other hand, there is no natural way to pick out which pattern of parameters should go with the first line of a quatrain. That is, in tree analyses the line sequencing rules make reference to parameters that concern labeling of nodes in the tree and that don't necessarily translate directly into whether the final syllable will be filled with an oblique or even tone. In fact, in Chen's (1979) analysis, the first lines of B verse (whether heptasyllabic or pentasyllabic) are well-formed only after application of his tonotactic condition. So the parameters he sets up are in no way transparently related to the fact that line 1 of any quatrain must end in an oblique tone. And Xue (1989) must presumably state something to the effect that F' is E for heptasyllabic left-branching and pentasyllabic right-branching verse, but F' is O for the other cases. Again, there is no clear relation here to the fact that line 1 must end in an oblique tone.

Any analysis which is to compete with the grid analysis, then, should strive to incorporate this relationship between the parameters of line formation and the rhyme schema.

A third difference between the grid analysis and the arboreal analysis was pointed out to me by Barry Miller (personal communication, 1990) and it comes out upon closer observation of the lines rejected by the tonotactic filter in (41) above. Let me repeat the relevant lines here for convenience. Beside each grid I have put its characterization in terms of the relevant parameters. For heptasyllabic verse they are:

(34)

```
    x   x               x               L   L   -
    x   x   x   x   /   x   x   x
```

(35)
```
    x   x                       x       L   R   -
    x   x   x   x   /   x   x   x
```

(37)
```
        x   x           x   x       R   R   +
    x   x   x   x   /   x   x   x
```

(40)
```
        x   x       x   x           R   L   +
    x   x   x   x   /   x   x   x
```

For pentasyllabic verse they are:

(45)

a.
```
            x                   -   L   -
    x   x   /   x   x   x
```

b.
```
                x               -   R   -
    x   x   /   x   x   x
```

c.
```
    x   x       x   x               +   L   +
    x   x   /   x   x   x
```

d.
```
    x   x           x   x           +   R   +
    x   x   /   x   x   x
```

Taking the heptasyllabic verse first, let us consider what a quatrain would look like if it were to start with a line like (37). Given our line sequencing rules, we'd produce the quatrain:

(52)   R   R +   (37)

         L   L -   (34)

         L   R -   (35)

         R   L +   (40)

We can see that the four lines which are rejected by the grid tonotactic filter are not randomly related to one another with the grid analysis. Rather, they go together in a quatrain that is well-formed with respect to line sequencing.

The same is true of pentasyllabic verse. So if we arbitrarily start with the first rejected line in (45) that has a second hemistich marked with the parameter R (since standard (that is, non-rhyming) first lines will have a second hemistich marked with the parameter R), we'll produce a quatrain made up of all four of the rejected lines in (45):

(53)   -   R -

         +   L +

         +   R +

         -       L -

While in (52) we started with the line in (37) and in (53) we started with the first line in (45) whose second hemistich is marked with the parameter R, we could as easily have started with any other of the rejected lines and still come up with a quatrain that contains precisely all the lines rejected by the grid tonotactic filter.

The grid analysis, then, is predicting the existence of quatrains with the patterns in (52) and (53) (where either line 1 or line 3 of these quatrains could be the first line of a quatrain, since both have second hemistiches that are marked by the parameter R) in Chinese regulated verse if there are any poets of this verse that ignore the grid tonotactic filter. This is an interesting prediction, although I have been unable to verify it within Chinese verse.

However, if we step outside Chinese verse proper, we can find data that suggest these hypothetical quatrains actually occurred. Mair – Meir (1991) trace a single line of verse tradition from the *sloka* meter of Sanskrit to Chinese tonal verse to folksongs in the Wu-ming dialect of Tai collected by Li Fang-kuei ([1956]; see also Li [1977, 20ss.]). These Tai folksongs are written in pentasyllabic lines that form couplets that pair into quatrains. A typical quatrain has the form:

(54)   x   x   x   x   A

          x   x   A   x   B

          x   x   x   x   B

          x   x   B   x   A

Here "x" indicates a syllable whose tone is free. "A" indicates a syllable with a fixed type of tone (either even or oblique). "B" indicates the opposite fixed type from "A". If we let A = even, then we can see that the lines in (45) arranged in any of the following four ways could be possible quatrains in these folksongs.

(55)   45c   45c   45a   45a

          45b   45d   45b   45d

          45d   45b   45d   45b

          45a   45a   45c   45c

These Tai folksongs, then, lend support to the existence of the grid tonotactic condition (or some condition with the same effect --such as that proposed in (64) below), since we can propose that this condition was lost when the poetic tradition passed from China into Thailand.

We can see that the grid filter is capturing a generalization that the tree analysis misses: the grid filter rejects not just ill-formed individual lines, but ill-formed whole quatrains. In pentasyllabic verse it rejects quatrains in which the first and third columns of the matrix of parameters are identical (both + or both -). In heptasyllabic verse it rejects quatrains in which the first column is R with the third column being + and in which the first column is L with the third column being -. We would want any competing analysis to capture this generalization, particularly in light of the Tai folksongs.

There is one more major difference between the grid analysis and tree analyses, and that is how they handle variations in the tonal system. I delay discussion of this point until section 6 below.

Before leaving this section, it is valuable to talk about the theoretical viability of the grid analysis. We have already cast doubt in this section on the viability of the grid as a model for the tonal system because the hemistich formation rules call for truncation of one or two grid columns, an innovative and theoretically risky proposal. There are other problems with the grid, as well.

Probably the most lovely uses of the metrical grid have been with respect to rhythmic clashes, where marks on a grid are manipulated in various ways. Napoli's grid analysis of the tonal system of Chinese regulated verse, however, is unlovely in this regard. It makes no use of the power of the

grid. The grid tonotactic filter, for example, makes the point painfully clear. Looking back at (34), (35), (37), and (40) (which are repeated above), we see that this filter knocks out lines with sequences of four like tones in a row, which can be seen as natural on the grid, since lapses are as much to be avoided as clashes (see Selkirk [1984]). But it also knocks out lines in which the second hemistich begins with a grid peak or a grid valley (in the sense of Hayes [1983]), which can be seen as total anathema to the grid. That is, peaks and valleys should be ideal patterns on a grid, at least so long as they conform to the desired alternation pattern. But in Chinese regulated verse peaks and valleys on the first position of the second hemistich are always and absolutely banned. This is a major reason to abandon the grid analysis.

6. THE 1-3-5 RULE

Many scholars through the years have pointed out the existence of tonal schemes other than the canonical schemes outlined in section 1 above. Generally, positions 1, 3, and 5 of heptasyllabic verse and 1 and 3 of pentasyllabic verse exhibit some degree of tonal freedom (Wang [1957]). For this reason, scholars sometimes talk of the "1-3-5 problem" or the "1-3-5 rule" or simply "1-3-5". A complication of 1-3-5 is that while 1 is said to be always free, not all three of these positions may simultaneously exhibit tonal freedom. Wang (1957) attributed this complication to the fact that if all of 1, 3, and 5 were allowed to be free simultaneously, we could wind up with lines that contained only one even-tone syllable. But there is an absolute prohibition against this, commonly dubbed the solitary-even-tone offense. Evidence for the solitary-even-tone offense comes from the fact that in pentasyllabic verse we cannot have freedom of both positions 1 and 3 if the result is a line with a solitary even tone, although we can otherwise have freedom of both positions l and 3 in pentasyllabic and heptasyllabic verse.

While the solitary-even-tone offense is a motivation for the complication in the 1-3-5 rule, motivation for the very existence of 1-3-5 is hard to come by.

Chen (1979) gives a nice overview of the positions that are free with respect to tone. Here I reproduce his patterns, with the free tones within parentheses. I give only the first quatrains, since the same pattern is found in second quatrains.

(56)	Heptasyllabic A	Pentasyllabic A
	(v) v (-) - - v v	(-) - - v v
	(-) - (v) v v - -	(v) v v - -
	(-) - (v) v - - v	(v) v - - v
	(v) v - - (v) v -	- - (v) v –

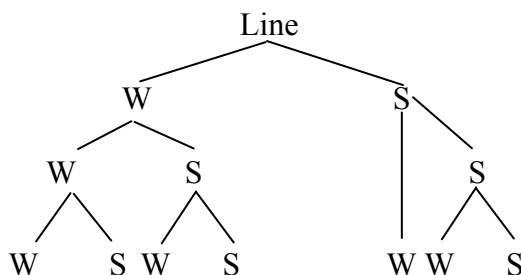| Heptasyllabic B	Pentasyllabic B
(-) - (v) v - - v	(v) v - - v
(v) v - - (v) v -	- - (v) v –
(v) v (-) - - v v	(-) - - v v
(-) - (v) v v - -	(v) v v - -

Chen devises a method for calculating the relative strength of positions in a line that depends crucially upon the tree analysis. He takes metrical trees like those in (5-7) above and labels each node of the binary-branching hierarchical structure as either S or W (clearly attributing the motivation for this labeling to Kiparsky [1977], who analyzed iambic verse). The S/W tree for (6), for example, would be:

(57)

Line

W   S

W   S   S

W   S W   S   W W   S

He then assigns numerical values to every node, ranging from -3 to +3, where terminal W is worth -3 and terminal S is worth +3, whereas the higher up the tree you go, the closer to zero the value of each node becomes. So the Ws and Ss that are on the next level up are worth -2 and +2, and so forth. Next, Chen adds up the values of all the nodes dominating each of the seven positions in the line. For the example in (57) the totals come to:

(58)   -6   0   -2   +4   -1   0   +6

Chen then argues that the lowest numerical values define the positions with the greatest tonal freedom. He therefore accounts for why the odd positions (except the final one), being the lowest in numerical value, have the potential to be free positions. He says that position 1 is always free because it is so dramatically lower in numerical value. Then either position 3 or position 5 will be free, with the choice depending on the factors of serial position, left/right branching of the tree (as in [2] versus [3] above), and even/oblique tone class.

For a thorough understanding of Chen's method, the reader needs to consult his article. But even with the brief outline above, the reader can see that the method is complex and ad hoc. The sudden emergence of the S/W system is motivated primarily by the recitation rhythms, discussed in

section 3 above. However, as I argued there, the S/W system appears to be appropriate for the rhythmic system but has no support for the tonal system. Furthermore, the numerical-value method required with the S/W system is mechanical and less than enlightening from my perspective, as well as being extremely complex in involving serial position, right/left branching, and even/oblique tone class.

Yip (1980a) offers an improvement on Chen within an arboreal analysis insofar as her account of 1-3-5 is maximally simple: she claims that to some extent all W positions are free. That is, all W positions are foot initial and, according to Yip, «departures from the norm would tend to disturb the pattern more than departures in less prominent (i.e. weak) positions» (111). Her account of 1-3-5, however, runs counter to the literature that I am familiar with on metrical freedom. As we have seen in much western verse, strong positions in a metrical pattern have more freedom as to how they are actually filled than weak positions (Halle – Keyser [1966; 1971]; Kiparsky [1975; 1977]; among others). Of course, these studies deal with stress-sensitive meters and one might counter that tone-sensitive meters need not observe the same principle. Still, Yip's account depends crucially on the iambic tree, and we have already seen that the iambic tree is probably irrelevant to the tonal system. Therefore, it is unlikely that an account of tonal freedom based on the iambic tree is correct.

Cheung (1980) offers the same basic proposal as Yip (1980a), connecting the 1-3-5 not to tree positions of W and S, however, but to rhythmically prominent positions. He claims that since the even-numbered words in a line receive the rhythmic beat, they are the ones that must observe the tonal schema strictly.

Downer – Graham (1963) take yet another approach. They claim that the even positions in the line have a fixed tonal pattern. But the odd positions have a tonal pattern that is largely determined by the rhyme scheme. That is, since only E syllables can carry rhyme in the Recent Style and since «rhymed and unrhymed final syllables contrast in tone» (146), if a line has rhyme, its final position will be E. That means the unrhymed lines of the same poem will have a final position filled by O. Downer – Graham go on to claim that the penultimate and final odd positions contrast in tone. Thus, once the tone of position 7, for example, is determined, the tone of position 5 is also determined. They further claim that the free syllables «borrow their tone from the immediately succeeding syllables, the first syllable from the second and the third from the fourth» (146). This system has considerable empirical adequacy (but see Ripley [1980], discussed below in this section). Its weakness, rather, is that it is highly arbitrary; there is no motivation for why precisely these cooccurrence restrictions should hold as opposed to any others.

Other recent accounts of 1-3-5 occur in the literature. Boyce (1980), building on work in Chao (1968), points out that rules of tonal sandhi work to change the tone most in positions 1, 3, and 5. He reasons that it is therefore not worth the poet's while to observe strict tone rules for those positions, since rules of sandhi may change them anyway. Chen (1980) argues against Boyce's account of 1-3-5 on the grounds of empirical inadequacy.

Napoli (1989) offers yet another analysis of 1-3-5:

(59) Tonal freedom in Chinese regulated verse:

   (A) The first position is free.

   (B) The final position is rigid.

   (C) There are precisely two free positions in each line.

   (D) The third position is free if it is typically filled with an oblique tone. If the third position is not free, the fifth is free if it is typically filled with an oblique tone. If neither the third nor fifth position is filled with an oblique tone, the third position is free.

Her justifications of (59) are complex. First, it appears to be a universal that within the line, metrical rules can be violated more easily at the beginning of a line and only with great difficulty at the end of a line (Herrnstein Smith [1969]; Kiparsky [1975], Zeps [1963; 1973]; among many others). Thus (59A) and (59B) are not surprising.

Second, the fact that precisely two positions are free in each line simply must be stipulated, although Wang Li's (1957) solitary-even-tone offense would motivate this restriction in many instances.

Third, we find that it is only odd positions that can he free. Notice that in the verse we are considering, we have a first hemistich made up of four positions and a second hemistich made up of three positions. If the principle alluded to above of more rigidity as we reach the end of a line and more freedom as we begin the line is carried over to each hemistich, then we expect positions 1 and 5, since they start hemistiches, to exhibit some freedom, whereas positions 4 and 7, since they end hemistiches, should be rigid.

As for position 3, it may he that we simply have to stipulate that position 3 can be free.

Alternatively, we could simply stipulate that all odd positions other than the final one can be free.

Fourth, we find that while position 1 is always free, position 3 is always free if it is typically filled with an oblique tone and position 5 is free only if it is typically filled with an oblique tone (and if at the same time position 3 is not free). What we see here is that positions that are typically filled with oblique tones have more freedom than positions typically filled with even tones. This is

not surprising in Napoli's grid analysis, since O tones are the prominent tones, and prominent positions are typically more free than weak positions (Halle – Keyser [1966; 1971]; Kiparsky [1975; 1977]; among others). The condition that position 3 or 5 be typically filled by an oblique tone is, therefore, one with parallels in other types of verse.

The fact that if both positions 3 and 5 are weak, then position 3 is free follows if we accept the stipulation in (59C), that each line must have two free positions, and the stipulation that only odd positions can be free, as well as if we observe the principle that freedom occurs more naturally toward the beginning of the line than towards the end of the line, thus position 3 will be chosen as free in preference to position 5.

Napoli's rule in (59) handles both types of verse so long as we derive pentasyllabic verse from heptasyllabic verse (as she does, following Chen [1979]) via truncation of the first two positions of the first hemistich after the application of rule (59). However, as we saw in section 3. 4 above, the direction of generation here is mistaken: heptasyllabic verse derives historically from pentasyllabic verse. This change in direction creates serious difficulties for (59), calling for even more complexities in the rule.

Given all these competing accounts of 1-3-5, one may feel confused. The simpler proposals are easy to find empirical and/or theoretical problems for. The more complex proposals are suspect by their very complexity. It is possible, however, that the answer to 1-3-5 eludes a clear solution because 1-3-5 is a false generalization.

Ripley (1980) is the only work I know of that does an in-depth study of variations in the tonal schemes. He studied 464 poems and found that if you take individual lines, about 80% of them observe the tonal scheme strictly. But if you study couplets, only 68.26% adhere strictly to the tonal scheme. And if you look at whole poems, only 25.86% have model or near model tonal schemes, where less than half a percent of all the poems have a perfect adherence to the tonal scheme. Ripley's point is that tonal variations are widely distributed in poems, so that very few poems have totally regular tonal schemes. He argues that the 1-3-5 rule is wrong-minded in that it suggests more possibility for variation in individual lines than is actually found.

Furthermore, Ripley looks at the four different lines of pentasyllabic verse and points out that each type of line exhibits a distinct pattern of tonal freedom. The line with pattern /- -v v -/ has a strict position 1 (where this fact is expected only in analyses that see pentasyllabic verse as being identical to the last five positions of heptasyllabic verse). The line with pattern /- - - v v/ exhibits more tonal freedom in the fourth position than the other three line types exhibit in the third position (an observation that no one else I have read has made). And, in fact, Bodman (1978) presents data

that show that position 4 in pentasyllabic verse may be free if position 3 is also free, an unexpected fact in anyone's explanation of 1-3-5.

Certainly, more detailed study is needed. But there is a distinct possibility that Ripley may be right in dismissing 1-3-5 as a false generalization. I leave this question open for future examination and in the remainder of this paper I will not consider further 1-3-5.

7. A NEW LINEAR ACCOUNT

A new account is called for, and I contend that a linear one can do the job admirably.

Let the basic unit be the first hemistich of pentasyllabic verse, which has the following generative rule:

(60) Construct a. hemistich of two positions, matching in tone type.

(60) will correctly generate two first hemistiches:

(61)   a.   -   -
          b.   v   v

The rule for generating the second hemistich of all verse will be:

(62) To either end of a first hemistich add a single position that contrasts in tone type.

(62) will correctly generate four second hemistiches:

(63)   v - - and - - v (from [61a])
         - v v and v v - (from [61b])

The rule for putting hemistiches together and forming pentasyllabic lines will be:

(64) Add a second hemistich to a first hemistich to form a line. Condition: the basic hemistiches before augmentation in (62) must have contrasting tone types.

To derive heptasyllabic verse we need:

(65) Double the first hemistich of a well-formed pentasyllabic line by adding positions of the opposite tone type.

With just these few rules we construct all and only the well-formed lines of Chinese regulated verse.

This linear account raises certain questions. Before addressing them, however, it is valuable to compare it to the equally generative linear account in Wang (1957), to which it owes much.

Wang proposed that both pentasyllabic and heptasyllabic verse could be derived from the two basic four syllable lines here:

(66)   - -   v v

(67)   v v   - -

To get pentasyllabic verse we augment (66) or (67) by adding a syllable of opposite tone to the last two syllables either in the middle or the end of the line:

(68)   from (66)
          (a) - - - v v
          (b) - -v v -

(69)   from (67)
          (a) v v v - -
          (b) v v - -v

To get heptasyllabic verse we start from pentasyllabic verse and prefix two syllables of opposite tone to the first two syllables:

(70)   from (68)
          (a) v v - - - v v
          (b) v v - - v v -

(71)   from (69)
          (a) - - v v v - -
          (b) - - v v - - v

This method correctly generates all possible lines of both kinds of verse. It differs from the present account in (60-65), however, in one crucial respect: it fails to recognize the existence of hemistiches. But without this recognition, we cannot account for the rules of line sequencing (easily accounted for below in this section with the present account), and, in fact, Wang offers no general

principle governing line sequencing. Furthermore, Wang's system calls for the insertion of syllables in initial, medial, and final position. While prefixation is clearly called for to derive heptasyllabic verse from pentasyllabic verse, Wang gives no indication of what determines whether a syllable is to be inserted medially or finally in the generation of pentasyllabic verse. In the present account in (60-65), affixation is always at the beginning or end of a hemistich -- natural positions for augmentation. Recognition of hemistiches, then, is basic to an understanding of Chinese regulated verse.

Returning to the present account in (60-65), we see that the first part of this analysis that demands attention is the condition on well-formedness in (64), which requires that the two hemistiches of a pentasyllabic line be of contrasting tone types before the augmentation rule in (62) takes place.

Downer – Graham (1963) offered a linear account of Chinese regulated verse that took the 1-3-5 rule as a fundamental organizing principle. In section 6 above we have already seen reason to doubt the existence of the 1-3-5 rule. Their analysis, then, was based on a shaky foundation (and see Chen [1979] for detailed criticism of their linear account). However, they offered a simple alternative to the well-formedness condition in (64): they noted for heptasyllabic verse that positions 4 and 6 could not be identical (where they also claimed that position 2 must match position 6 - but this restriction is no longer needed in the present account). Their prohibition follows from the condition on well-formedness in (64) (since positions 4 and 6 in heptasyllabic verse can never be identical in tone type given this well-formedness condition) and is beautifully simple in comparison with both Chen's (1979) tonotactic condition and Napoli's (1989) grid tonotactic condition. One might ask then why I don't simply adopt their prohibition instead of the well-formedness condition in (64).

The issue is a theoretical one, since both approaches handle the data adequately. However, Downer – Graham's prohibition as stated is arbitrary and disturbing in that it paves the way for allowing metrical rules to refer directly to any particular numbered syllable they wish. The well-formedness condition in (64), on the other hand, reflects a deeper generalization: the two basic hemistiches of the line (whether pentasyllabic or heptasyllabic) must he maximally different before augmentation (both augmentation by [62] or augmentation by [65]). This well-formedness condition, then, captures the insight of two maximally contrasting hemistich's that Chen's (1979) analysis captured (but with the mechanism of iambic trees that were inappropriate both because they confused tone with rhythm and because they called for truncation to derive pentasyllabic verse instead of augmentation to derive heptasyllabic verse).

The next thing to account for is the rules of line sequencing. The rules I propose are translations of Napoli's from the grid onto a linear analysis. The relevant parameters are two: (1) does the hemistich have O at its Left or Right end (Napoli's L and R parameters)? And (2) does the hemi-

stich have two O's (+, for maximum number possible) or only one (-, for less than maximum possible) (Napoli's + and - parameters)? We can then characterize each line of heptasyllabic verse precisely as Napoli (1989) did, see the discussion of (46) through (51) in section 4 above.

As a result of the fact that the rules of line sequencing here are identical to those in the grid analysis, all of the advantages that the grid analysis had (and see section 5 above) are maintained in this new linear analysis. Furthermore, all the strengths of Chen's analysis (outlined in section 3 above) are found in this new linear analysis. Let me list all those advantages here for convenience's sake.

First, Chen's original insight that hemistiches are the basic units of regulated verse is maintained. Additionally, due to our well-formedness condition in (64), the insight that these hemistiches (before augmentation) must be maximally different is maintained.

Second, the rules for the sequence of lines use parameters of the formation of the lines (an insight of Chen's, but with the parameters of Napoli).

Third, Chen's derivation of one type of verse from the other is maintained, with all the consequent explanatory advantages. The generation of heptasyllabic verse from pentasyllabic (instead of vice-versa, as in Chen's analysis) furthermore, is true to the historical development of verse form. If pentasyllabic verse were generated from heptasyllahic verse, on the other hand, we would have no way to account for its appearance so many years before heptasyllabic verse.

Fourth, we will in this new theory state explicitly that the first and second lines of a quatrain must be maximally different (an implicit claim of Chen's, but explicit in Napoli -- with different predictive value, as outlined in section 5).

Fifth, Napoli's generalization that a parameter of line formation picks out the possible first lines of a quatrain is maintained, since there is a natural relationship between this parameter and the rhyme schema.

Sixth, just as Napoli's grid tonotactic condition filtered out whole ill-formed quatrains rather than individual lines, so the well-formedness condition in 64 filters out whole ill-formed quatrains. The Tai folksongs studied by Li Fang-kuei (1956) and discussed in Mair – Mei (1991), then, can be accounted for by proposing that Tai dropped this condition (as well as adopted new rules of line sequencing, see [54-55] above).

On the whole, the new linear analysis is simpler than and both empirically superior to all the other analyses discussed in this paper. One would hope that the superiority of a linear analysis would fall out as a consequence of some more general set of principles governing the analysis of metrical structures. I believe that a more general principle may lurk in the fact that both metrical trees and metrical grids have been used in the literature to handle patterns of rhythm. Tone is a dif-

ferent type of phenomenon from rhythm. It may be that this difference, however it is to be characterized, precludes tone from being adequately analyzed with trees or grids.

In conclusion, while the rhythmic system of Chinese regulated verse may be best handled with a tree analysis, the tonal system of Chinese regulated verse is best handled with a linear analysis. Here we see that arboreal and linear approaches complement each other, rather than supplant one another, in acting together to produce the complex metrical structure of Chinese regulated verse.

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中國律詩聲韻的系統

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上半世紀的研究論著，對律詩的分析至少有三種不同的描寫方法：線性的分析，詩韻律的樹狀圖和詩韻律的格子狀分布。王力（1957），Downer 和 Graham（1963），Tsou（1988），以及 Jakobson（1970）都對律詩提出線性的描述，1979 年 Chen 指出所有的這些描述都缺少足夠的立足點。

Chen 提出第二個描寫方法：他用的是詩歌隱藏有繁殖能力的理論；這是韓近幾年發展出來的樹狀圖分析法。這種分析法受到廣泛的讚揚（如 Graham 1980，Yip 1980a 和 b，Xue 1989）。

一些語言學家對 Chen 論文中不同部分提出明確的批評（如 Liu 1980，Schlepp 1980b）；也有一些語言學家對 Chen 某些分析的細節提出相反的証據，但是沒有指明是針對 Chen 的文章（如 Boyce 1980，Chuang 1980，Ripley 1980），據我所知，目前只有兩篇文章針對 Chen 的理論，提出新的或完全不同的另外一套分析；一篇是 Lorentz 1980 年提出的線性分析，一篇是 Napoli 1989 年的詩韻律格子狀分析。

在這篇文章裏，我論証如果只採用一種分析法，不管是線性的也好，樹狀圖的也好，格子狀分布的也好，都不能涵蓋中國律詩的各個方面。對過韻律，樹狀圖的方法最適合分析韻腳的型態，線性分析法最適合聲調韻型態的研究。