A METRICAL GRID ANALYSIS OF CHINESE REGULATED VERSE
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Prince 1983 and Selkirk 1984 argue that hierarchical prosodic constituents, as in metrical trees, should be excluded from metrical theory. Recent analyses of Chinese regulated verse use trees (Chen 1979, Yip 1980, Xue 1989). However, a grid analysis is superior to tree analyses, which supports the contention of Prince and Selkirk.
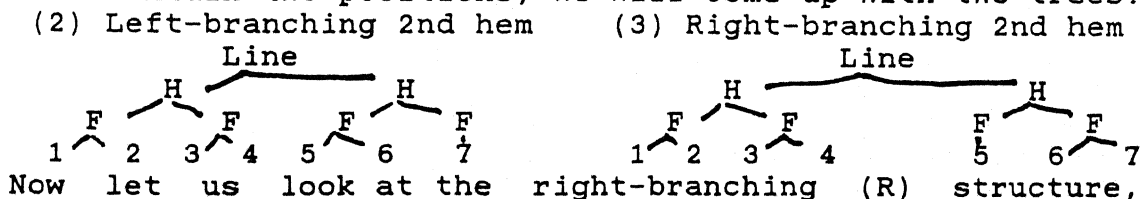
I present Chen's analysis in detail, since much of his analysis remains unchanged in Yip and Xue. Then I present Yip's and Xue's modifications to tone labeling of nodes in the metrical tree. Finally, I present a grid analysis.

1. Chen's analysis. Chen gives the following tonal schemes for Chinese regulated verse.

(1)

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 -	
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 - -	

("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 notes two facts that must be accounted for: the second quatrain is identical to the first (and for this reason I have given only the first in 1 above), and P(entasyllabic) verse is identical to the last five positions in the corresponding H(eptasyllabic) verse.

Chen proposes a tree analysis. First, consider H verse. If the line consists of two hemistichs (hereafter "hems") containing two feet, and one of the two feet of the second hem contains only one position, whereas all other feet contain two positions, we will come up with two trees:
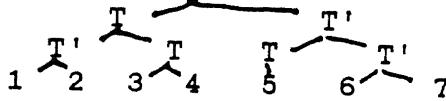
(2) Left-branching 2nd hem   (3) Right-branching 2nd hem

Now let us look at the right-branching (R) structure,

letting all sister constituents down to the level of the metrical foot have opposite tones assigned to them like so:

(4) T ---> T' T   and   T' ---> T T'

Here T' = the opposite tonal specification from T.   Let us start with the first hem being marked T, as in 5:

(5) Line

```
        T
   T'        T'
 T'   T   T     T'
1   2 3  4 5  6   7
```

(6) Line

```
        E
   O        O
 O   E   E     O
v  v - -  - v  v
```

In 6 we see the tone labeled tree if T = E(ven), and T' = O(blique). .6 is, in fact, the pattern we find for 1,HA (to be read "line 1 of Heptasyllabic A verse").   If, instead, we let T = O, then T' = E. The tree with tone specified will be have precisely the opposite labels on all nodes, with the terminal string:

(7) - - v v v - -

This is, in fact, the pattern we find for 2,HA.

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

(8) v v - - - - v

And if we set T = O, we find:

(9) - - v v v v -

Neither of these two patterns are found in verse, however. Chen accounts for this with his T(onotactic) condition:

(10) 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).

10 applies always and only to an L structure, as the reader can easily verify. It converts 8 to:

(11) v v - - v v -

And the T-condition will convert 9 into:

(12) - - v v - - v

But now we see that 12 is, in fact, the pattern we find for 3,HA and 11 is the pattern we find for 4,HA.

Let me summarize the findings thus far. There are two parameters: whether a structure is R or L and whether we set T to equal E or O. With the given values for these parameters, we generate all the lines of the first quatrain of HA verse in this way:

(13) R, E ---> line 1
     R, O ---> line 2
     L, O ---> line 3 (T-condition applied)
     L, E ---> line 4 (T-condition applied)

Chen notes that each line differs from the one immediately preceding it by a single parameter. The changing parameter

varies from R/L to E/O. This line sequencing results in repetition after line 4. So the second quatrain's tonal schema is identical to the first's by virtue of our line sequencing rules. Chen has accounted for the pattern of each line in HA verse and for the fact that the tonal schema of both quatrains is identical.

In 5 above we arbitrarily started with the hems labeled T and T'. If, instead, we label the hems T' and T, we have the foot pattern of T T' T' T. If we consider the R structure where T = E, we'll have the terminal string:

(14) $-$ $-$ v v v $-$ $-$

This is the pattern for 4,HB. And if we take the R structure where T = O, we'll find:

(15) v v $-$ $-$ $-$ v v

This is the pattern for 3,HB. Now let us keep our hems marked as T' followed by T and look at the L structure. Of course, now we will run into strings to which the T-condition will apply. If we set T = E, we'll have:

(16) $-$ $-$ v v v v $-$

T-condition$--->$ $-$ $-$ v v $-$ $-$ v

This is the pattern for 1,HB. Now let T = O, and we get:

(17) v v $-$ $-$ $-$ $-$ v

T-condition$--->$ v v $-$ $-$ v v $-$

This is the pattern for 2,HB.

HB verse has now been generated. I list the lines, noting the parameters of branching and tone assignment:

(18) L, E $--->$ line 1 (T-condition applied)
   L, O $--->$ line 2 (T-condition applied)
     R, O $--->$ line 3
   R, E $--->$ line 4

Again line sequencing involves changing one parameter each line, where that parameter must alternate between branching and tone assignment. So, again, the tonal schema of the second quatrain will duplicate that of the first.

Chen turns to P verse and notes that if we adopt a tree with hems, where hem 2 has the same possibilities as hem 2 of H verse, but hem 1 has only one foot with two positions, we will generate all the lines of P verse:
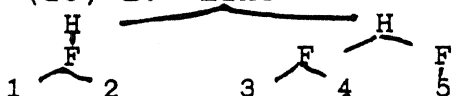
(19) L: Line   (20) R: Line
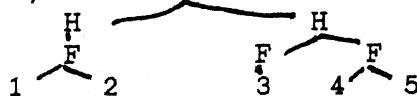
If a T on one metrical level dominates only a single node on the next metrical level, that node is also a T. But if a T on one level dominates two nodes on the next level, those nodes are T' and T. Since hem 1 of 19-20 contains

only one F, that F matches in tone assignment the second foot of H verse. We have now seen an account of why P verse is identical to H verse minus the first foot.

If we set hem 1 to be T, hem 2 will be T'. Now if we take an L structure with T = E, we'll get:
```
    (21)        -     -        -     -        v
T-condition--->-       -       v     v        -
```
This is 4,PA. If we change T to O, we find:
```
    (22)        v     v        v     v        -
T-condition--->v     v         -     -        v
```
This is 3,PA. The reader can go on to show that if we look at an R structure and set T = E, we'll produce 1,PA. And if we set T = O, we'll produce 2,PA.

If, instead, we set hem 1 to be T' and we set T = E in the L structure, after application of the T-condition we get 1,PB. If we change T to O, after the T-condition we get 2,PB. When we switch to the R structure with T = E, we find 4,PB. And if we let T = O, we find 3,PB.

Once more all of the lines of P verse are accounted for with a single tree, where we vary the parameters of E/O and R/L and where hem 1 can be T or T'. The line sequencing varies the two parameters in the same way as for H verse. Chen notes variations on these patterns, which we will discuss in section 3 below.

2. Tone labeling. Chen raises an alternative analysis in which direct tone labeling of the nodes in a tree eliminates the need for the T-condition (p.400):
    (23) Given sister nodes [N1, N2], N1 is labeled T iff it branches, otherwise N1 is assigned T'. N2 always takes the opposite label to that of N1.
He rejects 23 since it generates bad lines in P verse.

Yip 1980, however, argues against the T-condition and for two tone labeling conventions: one for H verse (that in 23 above), and another for P verse (where her convention for P verse labels N2 as T iff it branches).

Xue 1989 agrees with Yip that the T-condition is to be avoided and that tone labeling of nodes is the correct way to do that. However, he argues that positing different conventions for P and H verse misses the generalization that P verse looks like H verse minus the first foot. Instead, he offers 24 for both H and P:
    (24) In a pair of sister nodes [N1,N2], N1 is labeled N' iff it branches, otherwise N2 is labeled N'.

While analyses like Yip's and Xue's do not call for a T-condition, they make use of the tree hierarchy in tone assignment and line sequencing.

3. Metrical grids. Let us use Chen's insight that Chinese regulated verse consists of hems (which both Yip and Xue also use). Let us assume further that every tone will get a place on the lowest level of the grid, but only oblique tones will get a place on the second level. This is a reasonable assumption, since oblique tones, in that they are falling and/or rising, are composite tones. Starting with H verse, hem 1 consists of four tones:

```
(25) x    x                    1,HA & 4,HA
     x    x    x    x          2,HB & 3,HB    .
(26)           x    x          2,HA & 3,HA
     x    x    x    x          1,HB & 4,HB
```

Grid construction for hem 1 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.

Hem 2 consists of three tones:

```
(28)      x    x  {1,HA  (29) x              {2,HA
     x    x    x  {3,HB       x    x    x    {4,HB
(30)           x  {3,HA  (31) x    x         {4,HA
     x    x    x  {1,HB       x    x    x    {2,HB
```

Grid construction of hem 2 at first appears to be:

(32) (first approximation)
    Hemistich 2: Level one has three positions.
    Tone Addition: Add one or two immediately consecutive positions to level two at either end.

We can see from this statement of the grid construction rules that the two hems are similar. The difference is that hem 2 is missing a grid column at one end. In order to capture this generalization, instead of 32, I propose the following formation rule for hem 2:

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

We now need to discover the rules for putting a first hem together with a second to form a line. Since there are two possible grids for the first hem and four for the second, we can produce eight possible different lines. However, only four of these are actually found in verse. (A slash on level one marks the boundary between hems.)

```
(34) 25  x    x                    x    x   1,HA &3,HB
     &28  x    x    x    x  /  x    x    x
```

```
(35) 25    x    x                   x                   not found
     &29    x    x    x    x /   x    x    x
(36) 25    x    x                             x         not found
     &30    x    x    x    x /   x    x    x
(37) 25    x    x                   x    x              4,HA &2,HB
     &31    x    x    x    x /   x    x    x
(38) 26                   x    x              x    x    not found
     &28    x    x    x    x /   x    x    x
(39) 26                   x    x    x                   2,HA &4,HB
     &29    x    x    x    x /   x    x    x
(40) 26                   x    x                   x    3,HA &1,HB
     &30    x    x    x    x /   x    x    x
(41) 26                   x    x    x    x              not found
     &31    x    x    x    x /   x    x    x
```

Clearly, all lines of H verse are generated. But four lines not found in verse are also generated. We expect the lack of 36 and 41, given Chen's T-condition. So let us (for the moment) adopt a corresponding filter on grid formation:

(42) (first approximation) Grid Tonotactic Filter: If putting two hemistichs together will result in four consecutive like values on level two (that is, a gap of four positions, or four filled positions), the line is rejected.

42 is initially attractive in that it has a naturalness to it; it can be viewed as an anti-clash or anti-lapse mechanism, typical of grids in general (Selkirk 1984).

The remaining question is how to filter out the produced but unattested 35 and 38. 42 will not filter out these lines. If a single filter is responsible for the lack of 36, 41, and 35, 38, we must conclude that despite the apparent naturalness of 42 as an anti-clash or anti-lapse mechanism, this filter is really of a different nature. We find that if we compare the good lines with all the lines which must be filtered out, a pattern emerges: a whole line is good only if hem 2 begins with a column that is like one of its flanking columns and unlike the other. That is, the start of hem 2 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). We replace 42 with:

(43) Grid Tonotactic Filter: If putting two hemistichs together results in the second hem beginning with a column that is like or unlike both of its flanking columns, the line is rejected.

With 43 we generate all and only the good lines of H verse.

Now let us ask why the second quatrain is identical to the first and why P verse is identical to the last five

positions in the corresponding H verse. The second question is quickly answered. Let the grid formation rule for hem 1 for P verse be:

(44) (first approximation) Hemistich 1 for P verse:
Level one has two positions.
Tone Addition: Add two positions to level two, optionally.

The rules for formation of hem 2 for P verse are identical to those for formation of hem 2 for H verse since the set of possible hem 2's in P verse is identical to the set of possible hem 2's in H verse. In both, hem 2 is formed via deletion of the first or last column from hem 1 of H verse. That is, 33 holds for both H and P verse. In fact, since hem 2 of P verse must be derived via the rules for hem formation for H verse, we might as well have hem 1 for P verse also be derivative from H verse:

(45) (second approximation)
Hemistich 1 for P verse: Delete the first two or last two columns from hemistich 1 of H verse.
(In 61 of section 4 below we will modify 45 further.)

Now the T-filter in 43 above will allow us to produce all and only the good lines of P verse. Our hem 1's are:

```
(46)            and:   x     x
      x     x          x     x
```

Our hem 2's are:

```
(47) x                      x     x
     x    x    x            x     x    x
and:               x              x    x
     x    x    x            x     x    x
```

Putting them together into whole lines we produce:

```
(48)           x            rejected by T-filter
    x    x  /  x    x    x
              x    x        4,PA & 2,PB
    x    x  /  x    x    x
              x            rejected by T-filter
    x    x  /  x    x    x
              x    x   1,PA & 3,PB
    x  · x  /  x    x    x
    x    x    x        2,PA & 4,PB
    x    x  /  x    x    x
    x    x    x    x    rejected by T-filter
    x    x  /  x    x    x
    x    x            x   3,PA & 1,PB
    x    x  /  x    x    x
    x    x            x    x   rejected by T-filter
    x    x  /  x    x    x
```

In sum, Chinese regulated verse is formed off a single pattern, that for hem 1 in H verse (in 27). Hem 1 of P

verse and all hem 2's are truncated forms of H hem 1.

To figure out why the second quatrain is identical to the first, we, like Chen, look to line sequencing rules. Beginning with H verse, we see two parameters for grids. One is whether the filled positions on the second level appear at the Left or Right end (L/R) of the hem. The other is whether hem 2 has one or two filled positions on the second level. I will mark this parameter as -/+, where - stands for less than maximum (ie., 1) and + stands for maximum (ie., 2) number of possible filled positions on level two. For hem 1 the only relevant parameter is L/R. The pattern we find for HA is 49 and for HB is 50:

```
(49) L    R +        (50) R    R -
     R    L -             L    L +
     R    R -             L    R +
     L    L +             R    L -
```

If we consider 49 and 50 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 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 HA for example):

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

The next line will have only the middle column changed:

```
(52) L    R    +
```

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

We see a principle emerging, as Stuart Davis (pc) has pointed out to me: lines 2 and 4 are maximally different (in all three columns) from lines 1 and 3, respectively. But line 3 is minimally different from line 2.

Turning to P verse, we see again two parameters. But now only the + (maximum, equaling 2) versus - (less than maximum, equaling 0 in P verse) parameter is relevant for hem 1. Both +/- and R/L are relevant for hem 2. The pattern for PA is 53 and for PB is 54:

```
(53) -    R +        (54) +    R -
     +    L -             -    L +
     +    R -             -    R +
     -    L +             +    L -
```

Once more our line sequencing works, where the middle variable changes from one line to the next, but the outer variables change every other line. Again, line sequencing predicts that the second quatrain in P verse will be identical to the first. And, finally, lines 2 and 4 are maximally different from lines 1 and 3, whereas line 3 is minimally different from line 2.

4. Comparison of the analyses. At this point the grid analysis in section 3 and the tree analysis in section 1 account for the same data. There are differences between a tree analysis and a grid analysis that are more than terminological, however. The first difference involves line sequencing. One of the principles of line sequencing with the grid analysis is that line 1 should be maximally different from line 2. Given line 1 of 51, for example, we might have generated line 2 by changing only the value of the middle column rather than by changing the values of all three columns. But in both H and P verse from line 1 to line 2 we see changes in all three columns. Chen's tree analysis did not incorporate a principle of maximal difference between lines 1 and 2, nor did Xue's.

There is evidence that this principle is correct. Chen notes that only lines ending in an even tone can rhyme. That means that only lines whose hem 2 is marked L (+ or -) can rhyme. It also means that typically rhyme is limited to lines 2 and 4. However, sometimes rhyme is found in line 1. In those instances the typical pattern of line 1 is replaced with a pattern having hem 2 marked L. There are two such line patterns: those of lines 2 and 4. Given the principle that lines 1 and 2 should be maximally different, we 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. With the grid analysis this is predicted. But with a tree analysis Chen had to add the condition (that is not invoked anywhere else) that "no two adjacent lines may be identical" (p. 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 lines 4 and 5 of the entire poem will have identical tonal schemas. The only way Chen's condition could be adequate would be if rhyme were allowed only in line 1 of the first quatrain and never in line 1 of the second quatrain.

Given the rhyme pattern, we can see another advantage of the grid analysis. The first hems of line 1 in all four verse types represent all the possible first hems allowed

in Chinese regulated verse (all the possibilities generated by 27 and 45). The second hems of line 1, however, are restricted: they must be marked with the parameter R (whether +'or -). But a line with a hem 2 marked R ends in an oblique tone. The generalization is obvious: line 1 is restricted by its final syllable: it must be an oblique tone. This generalization follows from the rhyme pattern plus the principle that lines 1 and 2 must be maximally different. That is, if line 2 bears rhyme, line 2 will have hem 2 marked L. But, then, line 1 will have hem 2 marked R, since it must be maximally different from line 2.

With a tree analysis there is no natural way to pick out which pattern of parameters should go with line 1. In tree analyses the line sequencing rules refer to parameters of tree node labeling and don't necessarily translate directly into whether the final tone is oblique or even. In fact, in Chen's analysis line 1 of B verse (whether H or P) is well-formed only after his T-condition applies. So Chen's parameters are not transparently related to the fact that line 1 must end in an oblique tone.

A third advantage of the grid analysis, pointed out to me by Barry Miller (pc), comes out upon closer observation of the lines rejected by the T-filter, repeated here. Beside each grid I have put its characterization in terms of the relevant parameters. For H verse they are:

```
(35) x       x                       x              L L -
     x       x    x    x /  x    x    x
(36) x       x                            x         L R -
     x       x    x    x /  x    x    x
(38)              x    x         x    x              R R +
     x       x    x    x /  x    x    x
(41)              x    x    x    x                   R L +
     x    x    x    x /  x    x    x
```

For P verse they are:

```
(48)              x                            - L -
     x       x /  x    x    x
                                 x            - R -
     x       x /  x    x    x
     x       x    x    x
     x       x /  x    x    x                 + L +
     x       x              x    x
     x       x /  x    x    x                 + R +
```

Taking H verse first, let us consider what a quatrain would look like if it were to start with a line like 38:

```
(55) R R +  (38)
     L L -  (35)
     L R -  (36)
```

```
      R L +   (41)
```
We can see that the lines rejected by the T-filter are not randomly related to one another: they make up a quatrain that is well-formed with respect to line sequencing. The same is true of P verse. If we start with the first rejected line in 48 that has hem 2 marked R (since standard, non-rhyming first lines have hem 2 marked R), we produce a quatrain made up of all the rejected lines in 48:

```
(56)    - R -
        + L +
        + R +
        - L -
```

While in 55 we started with the line in 38 and in 56 we started with the first line in 48 whose hem 2 was marked R, we could have started with any of the rejected lines and still come up with a quatrain consisting of all the lines rejected by the T-filter. The grid analysis predicts the existence of quatrains consisting of the rejected lines in 48 if there are poets of regulated verse that ignore the T-filter. The filter captures a generalization: it rejects ill-formed quatrains.

A fourth difference is that the grid analysis does not incorporate feet. This difference has an advantage for tree analyses in describing P verse, since we can say that P verse is missing the initial foot of H verse. The grid analysis, instead, calls for the deletion of two columns (which are not a metrical constitutent) from the grid. But this difference has an advantage for the grid when it comes to seeing the generalization that hem 2 of both H and P verse is a truncated form of hem 1 of H verse (missing one column). It allows us to capture the insight that this same truncation, but on two columns, occurs in P hem 1.

Another difference comes up in considering tonal schemes other than the canonical schemes in 1. Chen notes that certain positions in the schemes in 1 are tonally free. I reproduce his data, encircling the free tones, for 1st quatrains (the same pattern is found in 2nd quatrains).

(57)

Chen devises a method for calculating the relative strength of positions in a line. He labels each node in a tree like those in 5-7 as S or W (motivated by Kiparsky 1977 on iambic verse). The S/W tree for 6, for example, is:

(58)

$$\begin{array}{c}\text{Line}\\ \text{W} \qquad\qquad\qquad \text{S}\\ \text{W} \qquad \text{S} \qquad\qquad \text{S}\\ \text{W} \quad \text{S} \quad \text{W} \quad \text{S} \quad \text{W} \quad \text{W} \quad \text{S}\end{array}$$
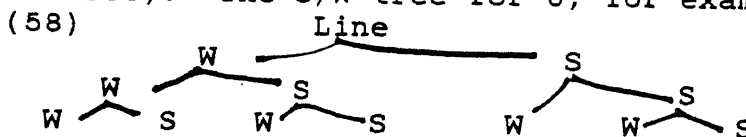
He assigns number values to nodes, ranging from -3 to +3, where terminal W is worth -3 and terminal S is worth +3, whereas the higher up the tree you go, the closer to zero the value of each node becomes. So the Ws and Ss on the next level up are worth -2 and +2, and so forth. Chen adds up the values of all the nodes dominating each of the seven terminal positions. For the example in 58 the totals are:

(59) -6 0 -2 +4 -1 0 +6

Chen argues that the lowest numerical values define the positions of greatest tonal freedom. That accounts for why the odd positions (except the final one), being the lowest in numerical value, have the potential to be tonally free. Position 1 is always free because it is so dramatically lower in numerical value. Then either position 3 or position 5 will be free, 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 this outline, the reader can see that the method is complex and surprising: we have suddenly been converted to an S/W system which is not transparently related to the tonal schemas. First, the S/W system is regularly alternating (iambic), but no line of our four types of verse can have regularly alternating even and oblique tones -- and we find sequences of as many as three like tones. Second, the S/W system suggests we should see some relatively easily discernible correspondence rules between S and W positions and tone realization, but none appear. The numerical-value method required with the S/W system is mechanical and unenlightening, as well as being complex in involving serial position, R/L branching, and E/O tone class.

A grid analysis of tonal freedom is entirely different and turns out to be simpler. Consider first H verse.

(60) Tonal freedom in H verse:
(A) The 1st position is free.
(B) The final pos. is rigid.
(C) There are precisely two free positions per line.
(D) The 3rd pos. is free if it is typically filled

with an oblique tone (v). If the 3rd pos. is not free, the 5th pos. is free if it is typically filled with v. If neither the 3rd nor 5th pos. is filled with v, the 3rd pos. is free.

Why should these be the rules for tonal freedom? First, it appears to be a universal that within the line, metrical rules are violated easily at the beginning and only with great difficulty at the end (Herrnstein Smith 1969, Zeps 1963, 1973, Kiparsky 1975). Thus A & B are not surprising.

Second, the fact that precisely two positions are free in each line must be stipulated, regardless of analysis.

Third, only odd positions can be free. In Chinese verse hem 1 is made up of 4 positions and hem 2, of 3. If the principle of more rigidity as we reach the end of a line and more freedom as we begin the line is carried over to each hem, we expect positions 1 and 5, since they start hems, to exhibit some freedom, whereas positions 4 and 7, since they end hems, should be rigid.

What about positions 2, 3, and 6? There are many possibile explanations for why positions 2 and 6 are rigid and position 3 can be free (including the idea that freedom should be dispersed throughout the line in an alternating way -- and see Hayes 1984 about the distribution of elements on higher levels in the grid), but none of them seem well-motivated. So we must stipulate that position 3 can be free. Alternatively, we could stipulate that all odd positions other than the final one can be free.

Fourth, while position 1 is always free, position 3 is always free if it is typically filled with "v" and position 5 is free only if it is typically filled with "v" and at the same time position 3 is not free. Positions that are typically filled with "v" have more freedom than positions typically filled with "-". This is not surprising, given the way we have formed our grids. Oblique tones correspond to columns with two levels filled on the grid, whereas even tones correspond to columns with only the first level filled. "v" positions, then, are stronger than "-" positions. (In fact, even tones go on long syllabic nuclei, and oblique tones ride on short vowels. But oblique tones are composite, since they rise and/or fall. Thus there is some phonetic naturalness to calling them strong.) As we have seen in western verse, strong positions in a metrical pattern have more freedom as to how they are actually filled than weak positions (Halle and Keyser 1966, 1971, Kiparsky 1975, 1977, among others). The condition, then,

that position 3 or 5 be typically filled by "v" is 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 stipulation C, 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.

For P verse, tonal freedom looks like it can be handled by similar rules with similar motivation, where we would talk about only one free position per line and about the freedom of positions 1 or 3 (rather than of positions 3 or 5). But maintaining two sets of tonal freedom rules misses a generalization: tonal freedom in P verse is predictable from tonal freedom in H verse. (And, recall that Xue's major objection to Yip's tone labeling conventions was the failure to capture a generalization across the two types of verse.) We need, then, one set of tonal freedom rules for all verse. A solution is to order the derivation of hem 1 of P verse from hem 1 of H verse after 60 has already applied to designate tonally free positions. To do this, we must make changes in our analysis. First, in 45 we allowed P hem 1 to be derived via deletion of the first two or last two columns of the grid of H hem 1. But we find in 57 that only the first two columns seem to have been deleted and never the last two. We can remedy this by changing 45 to allow deletion of only the first two columns (which will still generate the same set of hem 1's for P verse).

(61) Hemistich 1 for P verse: Delete the first two columns from hemistich 1 of H verse.

Second, we will take hem 1 of H verse and put it together with hem 2 of H verse (recall that hem 2 of P verse is identical to hem 2 of H verse, where both are derived from hem 1 of H verse), then apply the rules for tonal freedom in 60 to mark those positions on the grid which are tonally free, and then, finally, delete the first two columns of hem 1. The result will be P verse, correctly marked (by 60) for those positions which are tonally free.

There are other benefits to the grid analysis. There is no need to have an iambic pattern imposed on Chinese verse. The rules in 60 are motivated from the Chinese or from generalizations across languages. The exceptions are the stipulations that there be a fixed number of free positions per line and that only odd positions can be free. The first is needed regardless of one's analysis. The second is not needed by Chen -- but in its place we see an

elaborate mechanism for computing relative metrical strength and we need to consider three factors in determining if it will be position 3 or 5 that is free.

The grid analysis is simpler than tree analyses and superior in empirical adequacy. One would hope this result would fall out as a consequence of more general theoretical principles. The stipulation that metrical trees do not exist would rule out the tree analyses. This stipulation would follow from the general principle that hierarchical prosodic constituents are excluded from metrical theory. But Prince 1983 and Selkirk 1984 have argued for precisely this principle. The very fact that the grid analysis is superior supports the contention that hierarchical prosodic constituents are not part of metrical theory.

NOTES

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