Linguistics 251 Hayes/Schuh
Metrics Spring 2015

Class 10: The textsetting problem; Finding lines in song

1. Readings and assignments

- Bruce Hayes and Abigail Kaun (1996) The role of phonological phrasing in sung and chanted verse. *The Linguistic Review* 13:243:303. On course web site.

TEXTSETTING VS. METRICALITY

2. The textsetting scenario

- I give you a grid, say, this one:

		x				x				x				x	
x		x		x		x		x		x		x		x	
x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x

- I give you a text, say, this one:

  Among the leaves so green, O.

  along with its stress, phrasing, weight (?), etc.

- You give me the *optimal alignment of text to grid*.
- Or better, give me the probability of each logically possible alignment.
  - Only a few are likely to be considerable; I think the line above has only about 4.
- This is indeed a possible experimental scenario, done in actually practice by Hayes and Kaun (1996)

3. Some work on textsetting

- Halle, John and Fred Lerdahl. 1993. A generative textsetting model. *Current Musicology* 55:3-23.
- Hayes/Kaun, this time's reading
- Hayes, last reading "Textsetting as constraint conflict"
- Dell, François and John Halle 2009: ''Comparing Musical Textsetting in French and in English songs'', in Jean-Louis Aroui and Andy Arleo, eds., Towards a Typology of Poetic Forms, 63-78. Amsterdam: John Benjamins.
- Dell and Elmedlaoui's book on Berber song, which we will cover.

4. n combinatorics of textsetting: Pascal's Triangle

- If you have *n* grid slots and *m* syllables, *n* >= *m*, then the number of possible settings is given by Pascal's Triangle.
- Here is the beginning of Pascal's triangle, calculated with Excel and plotted with appropriate numbers of syllables and grid slots.

Syls	**Slots:**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**
0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
1		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
2			1	3	**6**	10	15	21	28	36	45	55	66	78	91	105	120
3				1	**4**	**10**	20	35	56	84	120	165	220	286	364	455	560
4					1	5	15	35	70	126	210	330	495	715	1001	1365	1820
5						1	6	21	56	126	252	462	792	1287	2002	3003	4368
6							1	7	28	84	210	462	924	1716	3003	5005	8008
7								1	8	36	120	330	792	1716	3432	6435	11440
8									1	9	45	165	495	1287	3003	6435	12870
9										1	10	55	220	715	2002	5005	11440
10											1	11	66	286	1001	3003	8008
11												1	12	78	364	1365	4368
12													1	13	91	455	1820
13														1	14	105	560
14															1	15	120
15																1	16
16																	1

- Illustrations
  - If you have **zero** syllables, there is only one alignment! (top row)
  - If you have **one** syllable, then the number of alignments is the same as the number of grid slots. (second row)
  - If you have the **same number of syllables and slots**, there is just one alignment (diagonal).
  - If there is **one syllable less than grid slots**, then the number of alignments is the number of grid slots (where to put the gap).
- For others, an example (boldface):
  - If you have 3 syllables and 5 slots, then there are two cases to consider.
    — 5th slot is filled: then total cases = 2 syllables into 4 slots (6 cases)
    — 5th slot is not filled: then total cases = 3 syllables into 4 slots (4 cases)
    — add them up: 10 cases
    — look at the arrows on the chart for this sum
  - Check the 3 syllables/5 slots case: if 1 is filled, 0 is not then:

1. X X X _ _
2. X X _ X _
3. X X _ _ X
4. X _ X X _
5. X _ X _ X
6. X _ _ X X
7. _ X X X _
8. _ X X _ X

9. _ X _ X X
10. _ _ X X X

- More generally, construct the chart *recursively* by doing the sum shown by the arrows everywhere — exactly how I did it in Excel.
- This is a standard way to construct Pascal's Triangle.

5. More generally

- We can generalize the method just given to allow for unaligned items on both tiers
  - All you need to do is draw a vertical arrow as well as the horizontal and diagonal ones.
- This turns out to be a fundamental procedure in string alignment (
  - Nice book by Joseph Kruskal (1998) *Time Warps, String Edits, and Macromolecules: The theory and practice of string comparison)*
- Useful, e.g. for
  - assessing similarity of phonological strings (Albright and Hayes 2003 *Cognition*, among many others)
  - finding the alternating segments of alternating morphemes (Dustin Bowers diss. in progress)

6. Consequences of Pascal's Triangle for GEN here

- With reasonable assumptions, we've got a quite modest GEN.
- 16 slots maxes out at 8 syllables: 12,870 candidates
- 24 slots maxes out at 12 syllables: 2,704,156 candidates

7. The standard way to enumerate GEN

- Start with a row of syllables and a grid.
- At any stage, put the first remaining syllable into any remaining grid slot *x*.
- Remember what you did for future reference.
- Chop off this syllable. Chop off all the grid up to and including *x*.
- Go back to the start and repeat with what you've got left.
- If you succeed in using up syllables and grid slots, keep the result.

This is a so-called recursive procedure.

8. The textsetting approach can only be an approximation, I think

- It fails to take into account phonological sequences that *sound bad in all grid alignments.*
  - Such sequences might be, e.g., very short or very long ones.

✓The keeper did a-shooting go,
And under his cloak he carried a bow

*The keeper did a-shooting go,
Pa ----- me ----- la!

- I think the *real* GEN is all phonological representations in all alignments with the grid!
- Human text-setters pick from the higher-probability alignments; and experience angst if that probability is too small.
- In other words, textsetting ought to be *reduced* to metrics!
- In an experiment, we can use as theory predicted probability that a consultant will pick a setting for text *t* the following formula:

$$p(\text{setting } x|\text{text } t) = \frac{p(\text{setting } x \text{ of text } t)}{\Sigma_y \, p(\text{setting } y \text{ of text } t)}$$

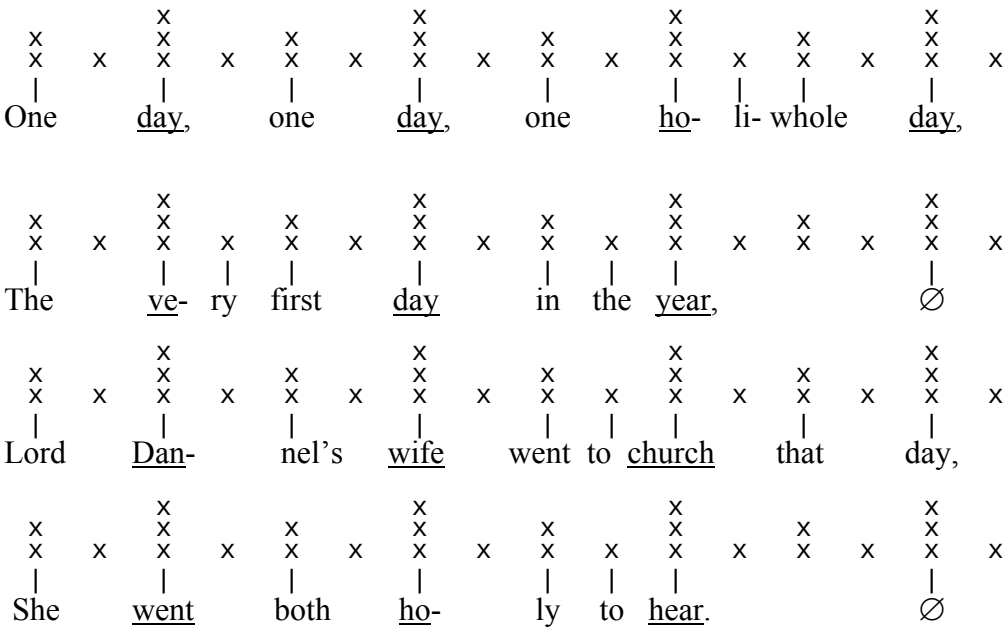
"The probability of setting x, given text t, is the share of its absolute probability in the total probability assigned to all possible settings of text t."

- But it's a plausible working assuming that people's *relative* intuitions for a given text will match up well with a grammar that picks the best setting for that text; a much smaller GEN and more feasible to study!

FINDING LINE BOUNDARIES IN SUNG VERSE

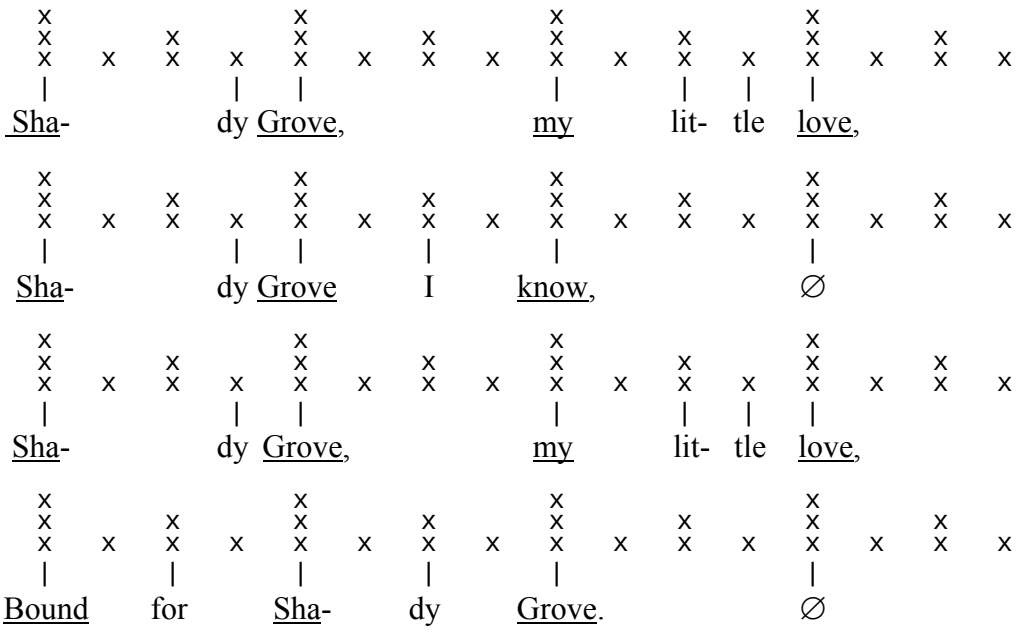
9. The Standard Grid of Appalachian folk song (most common)

A version of "Matthy Groves":



Karpeles 1932, #23K

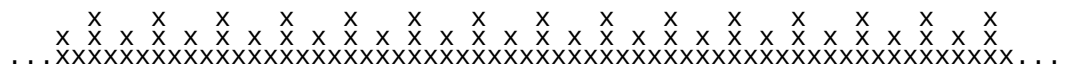
10. The "Shady Grove" grid



Ritchie 1965, p. 43

11. The Argument for Lines: look for periodic breaks on the "infinite grid"

- You can't hear the line boundaries at first but you can align the syllables to the infinite grid of song.

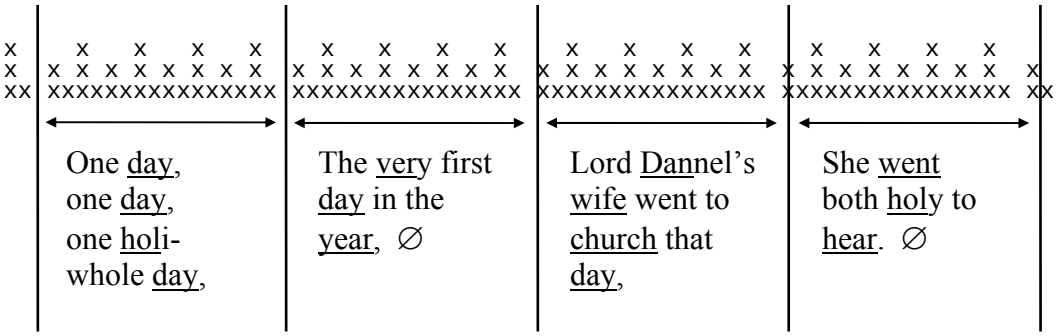


- As it happens, both the Standard Grid and the Shady Grove meters are compatible with this (always binary) Infinite Grid.
- Cf. the Khalilian circles (Arabic) and the Elwell-Suttonian circles (Persian), which unify meters along these lines.

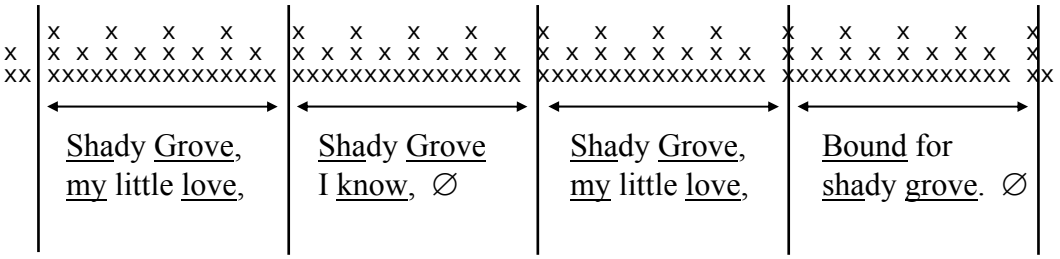
12. Essential claim

- If one takes almost any song, and aligns it with the correct "infinite" rhythmic grid, then it will be possible to cut the grid into perfectly equal pieces, such that the beginning and end of each piece will coincide with a large break in the P-structure of the associated verse.

13. Matthy Groves chopped



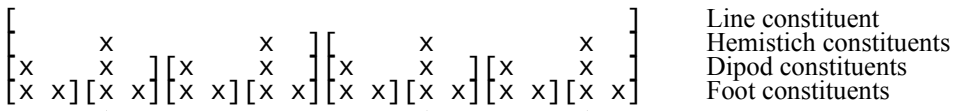
14. Shady Grove chopped



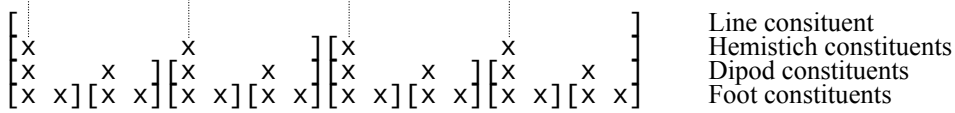
15. Theoretical claim: there are no infinite tapes

Only hierarchy with parallelism; different prominence relations within the various units.

16. Standard Grid



17. "Shady Grove"



- These differ only with respect to dipod (iambic in Standard Grid, trochaic in Shady Grove grid).

18. Empirical evidence from alignment of breaks

- Don't spill over the line (with occasional exceptions observed)
- Come as close as you can to the beginning of the line.

19. Line beginnings in Matthy Groves

Stanza 2: *The* **ver**y first man she saw that day
Was **lit**tle Matthy Grove. ∅
Rise **up**, rise up little Matthy Grove
And **you** go home with me. ∅

Stanza 4: *Now* **if** I am Lord Dannel's wife,
Which **you** suppose me to be, ∅
Lord **Dan**nel's gone to the ship
For to **sail** upon the sea. ∅

Stanza 6: *He* **run** till he came to the broken-down bridge,
He **leaned** to his breast and he swum, ∅
He **swum** unto the other side,
And he **fell** to his feet and he run. ∅

20. Line beginnings in "Shady Grove'

Verse 1: **Cheeks** as red as the blooming rose,
Eyes of the deepest brown; ∅
You are the darling of my heart,
Stay till the sun goes down. ∅

(chorus = first verse)

Verse 2: **Went** to see my Shady Grove
She was **stand**ing in the door, ∅
Shoes and stockings in her hand,
Little bare feet on the floor. ∅

Verse 3: **Wish** I had a big fine horse,
Corn to feed him on, ∅
Pretty little girl, stay at home,
Feed him when I'm gone. ∅

Verse 4: **Sha**dy Grove, my little love,
Shady Grove I say, ∅
Shady Grove, my little love,
Don't **wait** till the Judgment Day! ∅

Socrates: what is going on syntactically with this material related to the grid?

21. "Epenthetic a-" in the Standard grid

a. *A*-**hang**ed you shall be. ∅ (9.4)
b. *A*-**driv**ing his sheep to fold. ∅ (13.4)

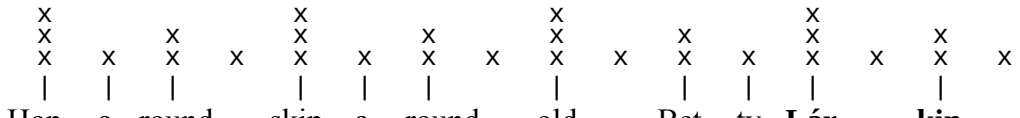
22. Frequency

- Songs with the "Little Musgrave" grid are considerably more common in our corpus than those with the "Shady Grove" grid — reflecting ease of composition?
- Ballads can't be in Shady Grove grid.

23. Abutting right edges

- Evidence is not so abundant or decisive.
  - Note *endings* are quite non-salient and variable.
  - You can lengthen phrase-finally (in both senses fo the term!) quite a bit, so hard to tell what is "filled".

24. Right edge filling in the Shady Grove grid



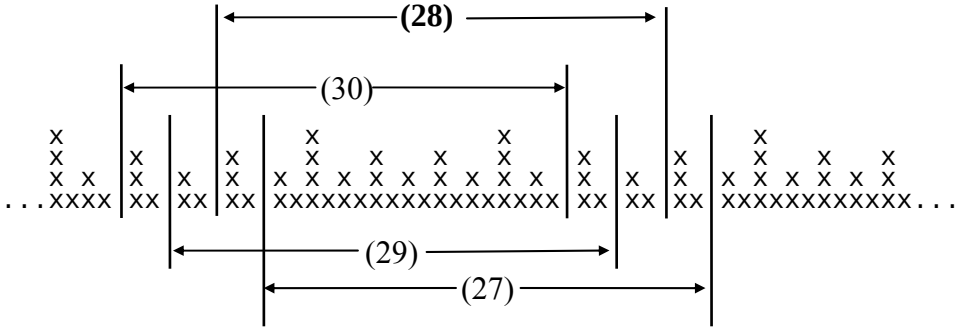
Ritchie 1965, p. 21

a. Goodbye girls, I'm goin' to **Bóston** Ritchie 1965, p.25
b. Dance to your Daddy, my little **láddie** Ritchie 1965, p. 89
c. Madam, I have gold and **sílver** Karpeles 1932, #92F
d. Now, my lad, we are **márried** Karpeles 1932, #154A
e. Lord, I'm a-climbing Jacob's **ládder** Karpeles 1932, #208B
f. Chickens a-crowing in the Sourwood **Móuntain**, Karpeles 1932, #216C
g. Buck Creek girl don't you want to go to **Crípple Creek**? Karpeles 1932, #241A
h. What shall we do with a drunken **sáilor**? traditional

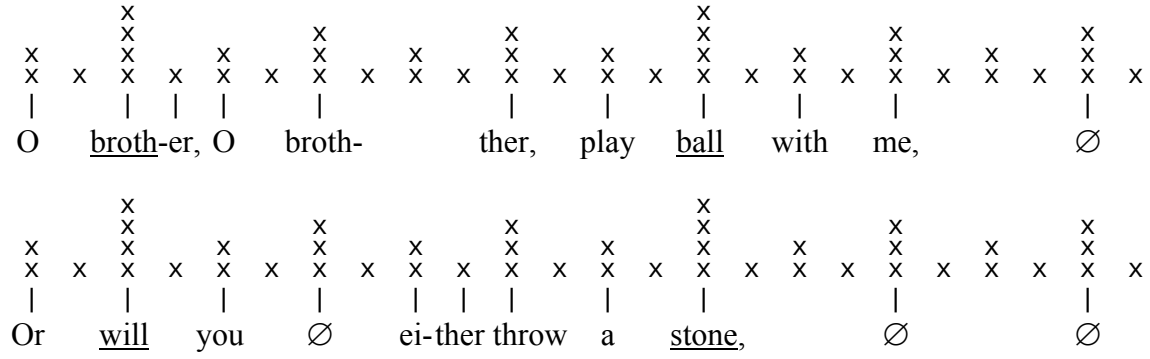
Far fewer feminine endings in songs composed to the Standard Grid.

25. A infinite grid with three division points

26.

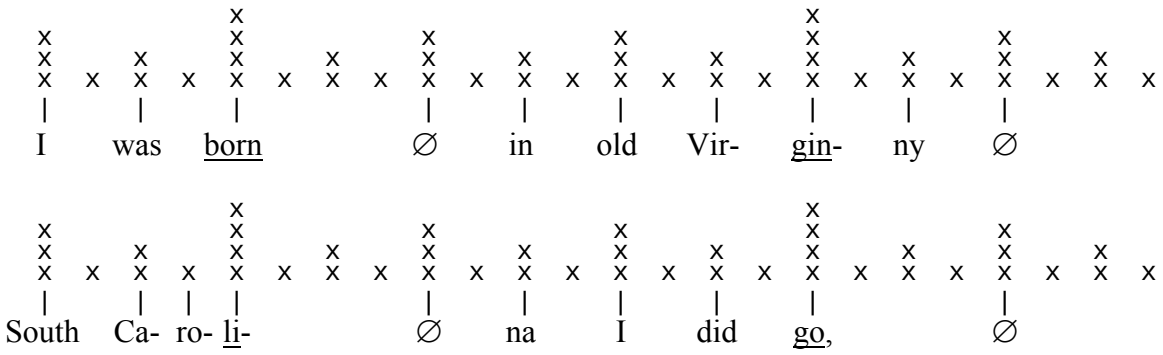


27.



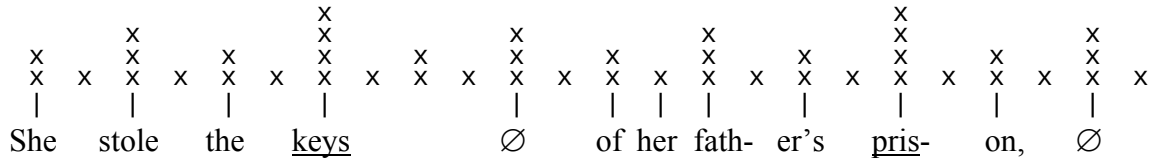
Karpeles 1932, #12G

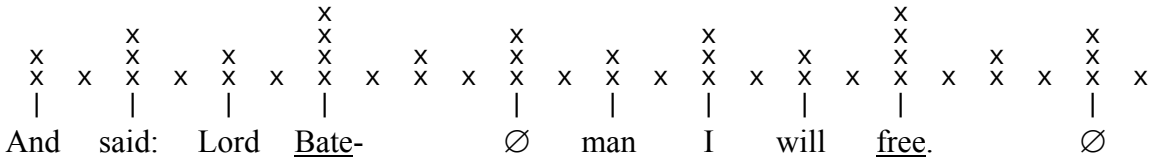
28.



Karpeles 1932, #167A

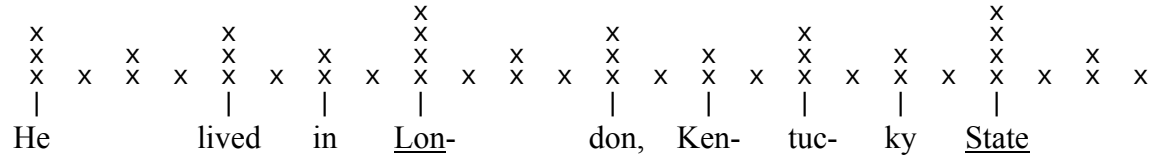
29.

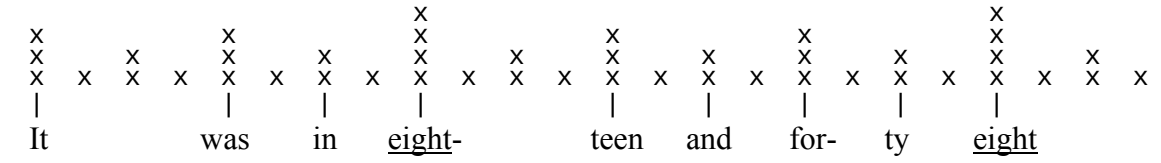




Karpeles 1932, #13G

30.

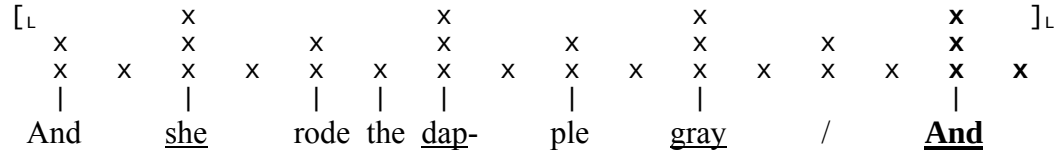


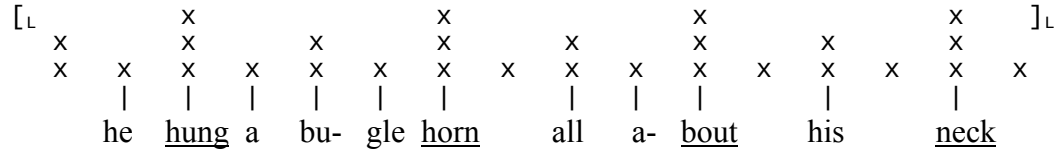


Karpeles 1932, #192

31. Exceptions to alignment are rare but exist

a. [$_L$ He jumped upon the milk-white steed]$_L$





[$_L$ And so went sounding away. ∅]$_L$ Karpeles 1932, #4B

b. [$_L$ There was a youth and a comely youth,]$_L$
[$_L$ One of the squire's sons. ∅]$_L$

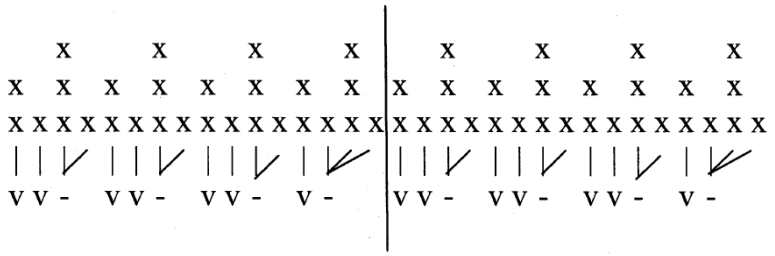
```
   x   x   x   x   x   x   x   x   x   x   x   x   x   x   x   x
   |       |       |   |   |       |       |       |       |
  He      court-    ed  the bail-   ie's    young-  est     daugh-

[L         x               x               x               x    ]L
   x       x       x       x       x       x       x       x
   x   x   x   x   x   x   x   x   x   x   x   x   x   x   x   x
   |   |   |       |   |   |       |       |               |
  ter, the bai-     lie of Haz-     ling    Town,           Town,
```

[L The bailie of Hazling Town. ∅]L Karpeles 1932, #30B

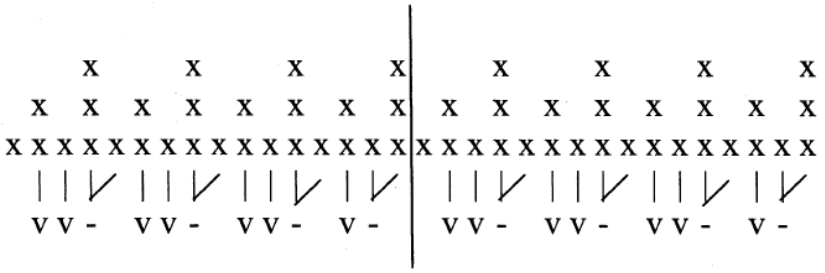
40. Back to Hausa

- The scholarly dispute that broke out last time concerned line division in a sung Hausa poem.
- Do we assume frequent "stealing", or do we be brave and actually reconfigure the meter
- Below, I show two lines in a row, under both theories.

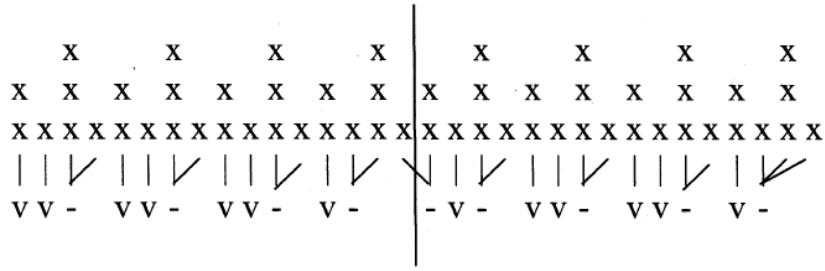
simple lines, Standard Grid (of Appalachia) (trochaic low, iambic high)



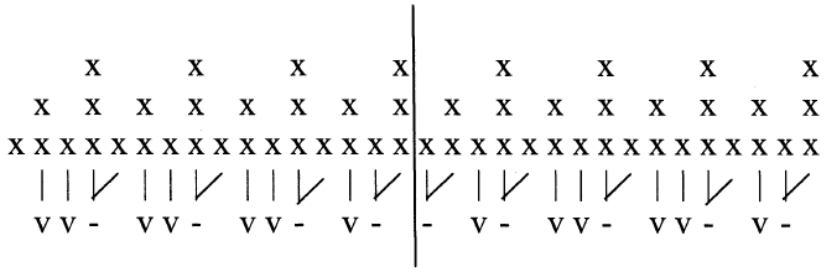
simple lines, Shifted Grid (iambic on two levels)



"overstuffed lines, Standard Grid (of Appalachia) (trochaic low, iambic high). Stealing.



simple lines, Shifted Grid (iambic on two levels). Empty position in first line



41. Virtues of the two analyses

- Standard grid
  - Princian theory of Metrical Positions (lowest level always trochaic) is maintained.
  - better rationale for slot-filling: last - gets three slots, per final lengthening principle

- Shifted grid
  - rationalizes the frequent line-beginning - v; meter has room for it (albeit as a syncopated heavy)
  - less "stealing" need be assumed.