The Programming Language Called Classical Chinese

David Branner
StrangeLoop ∞!? 2015

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   b. much descriptive grammar can be built on these principles
   c. many words of Chinese origin in Korean, Japanese, Vietnamese obey these rules

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I will also show how particles are added to clarify the inevitable cases of
ambiguity.

Contents and "you are here"

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Here, intrinsic meaning seems to be noun; verb derived.

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One-liner: Classical Chinese part of speech is malleable (indeterminate) and dependent on context, even if seemingly intrinsic on a semantic basis.

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Let's examine cases of the difference in behavior.

Sections

Parts of speech (POS)

  How do V and N combine? ←

    Context-free grammar

      "Weight" of elements

        Ambiguity

          Philosophy

            Recap of important points

              End

                Appendices

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Not only simple two-unit compounds, but even larger compounds can be
classified as ℕ or 𝕍:

word	POS	meaning
心	N	'heart'
口	N	'mouth'
心 口	N	'what one thinks and says'
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How ℕ and 𝕍 combine, 2

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One-liner: So definitions of 𝕍 and ℕ can have a recursive aspect.

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Parts of speech (POS)
  How do V and N combine?
    Context-free grammar ←
      "Weight" of elements
        Ambiguity
          Philosophy
            Recap of important points
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Formal rules for describing the relationships between the types of the literal components and the type of their combination

Context-Free Grammar

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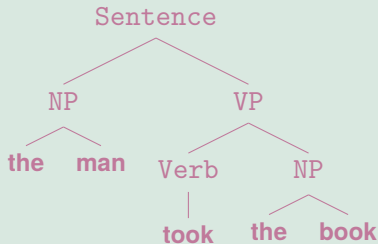The CFG model has been extremely influential in computer science theory, however.

Noam Chomsky

Image from https://www.pinterest.com/pin/462744930437017344, accessed 20150919

Conventional CFG distinguishes "terminal strings" (leaf nodes) from non-terminal strings (inner nodes) in a syntax tree (Chomsky 1956:117).
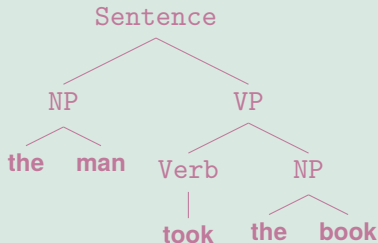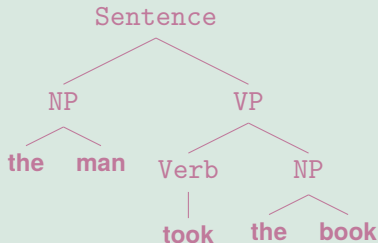
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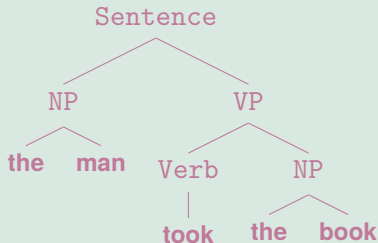Terminals (bold-faced) distinguished as not subject to "rewrite rules":

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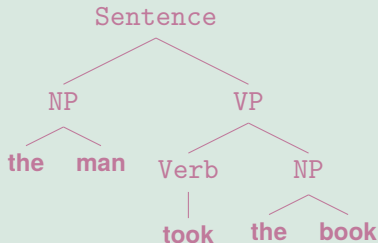
1. Sentence → NP VP

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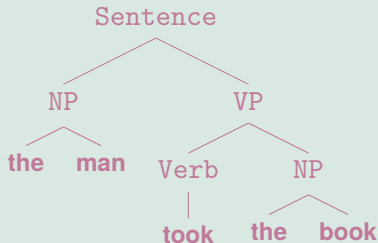1. Sentence → NP VP ("Sentence can be 'rewritten' as 'NP VP'.")

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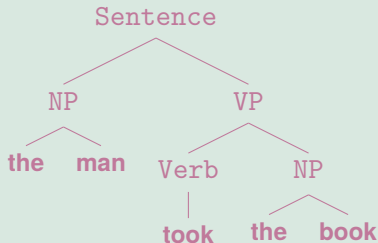3. $NP \rightarrow$ 'the man', 'the book' **(terminals)**

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3. NP → 'the man', 'the book' **(terminals)**
4. Verb → 'took' (**terminal**)

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Chomsky's key ideas: a) distinction between terminals and non-terminals;
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(I changed usual stem-node Sentence to String because of recursion.)

Sections

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All possible arrangements of combination with repetition and two types of weighting are attested over two-element groups: there are eight in all, and each is distinct and meaningful.

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'person'

心
'heart'   (N)-N: 'people's hearts/minds'

N N: 'people and hearts'

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N N: 'people and hearts'

人   心
'person'   'heart'   (N)-N: 'people's hearts/minds'

                                  N N: 'people and hearts'

人   之   心
'person'   ⟨disamb.⟩   'heart'   (N)-N: 'people's hearts/minds'

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'person'　　　　　　　'heart'　(N)-N: 'people's hearts/minds'
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'person'　　〈disamb.〉　'heart'　(N)-N: 'people's hearts/minds'

時　　　祭
'time'　'to sacrifice'　　N N: 'seasons and sacrifice'

時　　　　祭
'time'　'to sacrifice'　N N: 'seasons and sacrifice'
(N)-N: 'seasonal sacrifice'

時　　　祭
'time'　'to sacrifice'　N N: 'seasons and sacrifice'
(N)-N: 'seasonal sacrifice'
(N)-V: 'to sacrifice at correct times'

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以	時	祭	
‹disamb.›	'time'	'to sacrifice'	(N)-V: 'to sacrifice at correct times'

Sections
Parts of speech (POS)
   How do V and N combine?
      Context-free grammar
         "Weight" of elements
            Ambiguity
               Philosophy ←
                  Recap of important points
                    End
                       Appendices

Question: What is "context-free" about a Context-Free Grammar?

Philosophy

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One-liner: Classical Chinese grammar has approximately the order of formal simplicity of a programming language!

Sections

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3. The CFG described here assumes recursive definitions of the POS, and so avoids distinguishing "terminals" from "non-terminals".

Recap of important points

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Recap of important points

1. Classical Chinese part of speech is malleable and dependent on context, even if seemingly intrinsic on a semantic basis.

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5. Classical Chinese grammar has approximately the order of formal simplicity of a programming language.

End 終

Thanks to my **Recurse Center** cousins — **Katherine Ye** and **Mindy Preston** — for their conversations in early stages of organizing these slides. And thanks to **Rose Ames**, who kindly shamed me into submitting the presentation proposal in the first place.

Appendices
   Appendix I: Contentious issues for sinologists ←
     Appendix II: Examples
       Appendix III: Prosody
         Appendix IV: Other audience questions

Objection: What about particles whose function implies a POS other than
N/V, which would justify more POS for non-particles as well? Examples:
焉, 豈, 安, 胡 as adverb 'how?'.

Response: For one thing, all adverbial examples are interrogative, a very
small class of words.

For another, the non-particles (words whose basic meaning is not a
particle) among the interrogatives all seem to be of type N — 何, 誰, 孰
— if you consider them in terms of semantics (which I have explained I am
not doing here), I think they will all turn out to be pronouns.

Objection: I need to see a list of the disambiguating particles right now.

Response: Can you wait until I have a draft ready to circulate of the full grammar book? (Use "rhetorical question" emoji here.)

Objection: You should distinguish "adjectives" (for what you call "verbs of state") from true verbs ("of action"). Adjectives are distinct from verbs of action because they can be modified by adverbs of manner or degree, such as 甚, 至, 盡.

Response: What you are calling adverbs of manner or degree are verbs (甚 'to be severe', 至 'to reach [an extremity]', 盡 'to exhaust') being used to modify verbs of state; they are attested as verbs, and the behavior of verbs to modify other verbs (POS: (V)-V) is well documented. There is a pretty good case for distinguishing verbs and adjectives in Mandarin; in Classical Chinese the case is hard to make.

Question: What about pivot constructions, like those introduced by quotative verbs?

Response: How about treating the quotative verb, pivot noun, and following verb as V N V → V N?

Objection: What about reconstructed inflectional morphology? Doesn't that invalidate the whole premise of this talk?

Response: reconstructed inflectional morphology is a) not reflected in the writing system, which is the subject of this talk; b) highly tentative and of modern devising. Even if the current state of research is all on the right track, it doesn't affect the point that the written language has been propagated for millennia without reference to this knowledge. I have written elsewhere about this large subject.

Objection: What about generating valid sentences rather than merely parsing them?

Response: That would require a much more complex system, incorporating knowledge of idiom and collocation, and some of the things that Chomsky calls "context". It's true that one test of a description is whether it can be reversed to generate valid examples of what it is describing. But in this case there is not enough necessary information in the system.

"You are here"

Appendices

日 N: 'sun, day'; V: 'to last for a day'

String
'The sun appears in the east.' (禮記 祭義)

N
'the sun's rising'

V
'to take place in the east'

N — 日 'sun'

V — 出 'to emerge'

V — 於 'to be located at'

N — 東 'east'

日 N: 'sun, day'; V: 'to last for a day'

String
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N
'the sun's rising'

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'sun' 'to emerge'

V N
於 東
'to be located at' 'east'
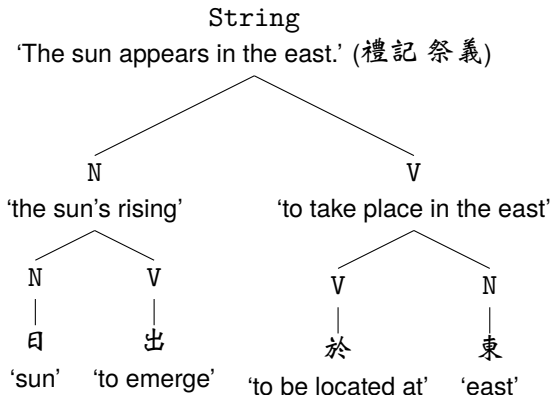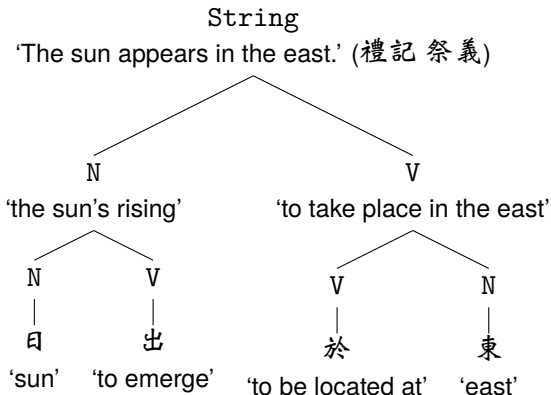
(* Why do I analyze this phrase as two units of two, rather than one plus three? See slide 43.)
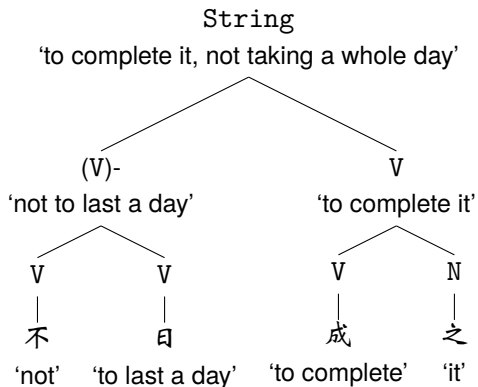
日 N: 'sun, day'; V: 'to last for a day'

String
'to complete it, not taking a whole day'

(V)-
'not to last a day'

V
'to complete it'

V
不
'not'

V
日
'to last a day'

V
成
'to complete'

N
之
'it'

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[The people] will get the work done in under a day. (孟子 梁惠王上)

日 N: 'sun, day'; V: 'to last for a day'

```
                        String
          'to complete it, not taking a whole day'


             (V)-                        V
      'not to last a day'          'to complete it'


      V            V              V            N

      不           日             成            之
    'not'   'to last a day'  'to complete'    'it'
```
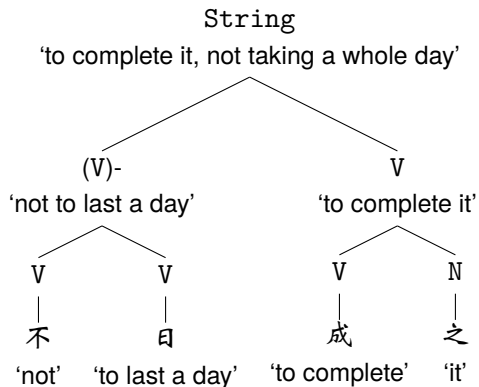
[The people] will get the work done in under a day. (孟子 梁惠王上)

We can tell that "day" is behaving as a verb because it is negated with a word 不 that negates verbs.

楚 N: 'state of Chǔ'; V: 'to behave as appropriate to the state of Chǔ'

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日	撻	而	求	其	楚
N	V		V	N	V
'day'	'to beat'	‹subord.›	'to seek'	'her/his'	'to behave as in Chǔ'

Examples of N → V

楚 N: 'state of Chǔ'; V: 'to behave as appropriate to the state of Chǔ'

日	撻	而	求	其	楚
N	V		V	N	V
'day'	'to beat'	‹subord.›	'to seek'	'her/his'	'to behave as in Chǔ'

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日	揵	而	求	其	楚
N	V		V	N	V
'day'	'to beat'	⟨subord.⟩	'to seek'	'her/his'	'to behave as in Chǔ'

日揵: (N)-V→ V 'to beat daily'

Examples of N → V

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日	撻	而	求	其	楚
N	V		V	N	V
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而: ‹subordinating particle›

Examples of N → V

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N	V		V	N	V
'day'	'to beat'	‹subord.›	'to seek'	'her/his'	'to behave as in Chǔ'

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求: V 'to seek'

Examples of N → V

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日撻: (N)-V→ V 'to beat daily'
而: ‹subordinating particle›
求: V 'to seek'
其楚: (N)-V→ N 'the situation that they behave as they should in Chǔ'

Examples of N → V

楚 N: 'state of Chǔ'; V: 'to behave as appropriate to the state of Chǔ'

日	撻	而	求	其	楚
N	V		V	N	V
'day'	'to beat'	‹subord.›	'to seek'	'her/his'	'to behave as in Chǔ'

日撻: (N)-V→ V 'to beat daily'
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楚 N: 'state of Chǔ'; V: 'to behave as appropriate to the state of Chǔ'

日	撻	而	求	其	楚
N	V		V	N	V
'day'	'to beat'	‹subord.›	'to seek'	'her/his'	'to behave as in Chǔ'

日撻: (N)-V→ V 'to beat daily'
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而: ‹subordinating particle›

楚 N: 'state of Chǔ'; V: 'to behave as appropriate to the state of Chǔ'

日	捷	而	求	其	楚
N	V		V	N	V
'day'	'to beat'	‹subord.›	'to seek'	'her/his'	'to behave as in Chǔ'

日捷: (N)-V→ V 'to beat daily'
而: ‹subordinating particle›
求: V 'to seek'
其楚: (N)-V→ N 'the situation that they behave as they should in Chǔ'

日捷: V 'to beat daily'
而: ‹subordinating particle›
求其楚: V N→ V 'to seek them to behave as they should in Chǔ'

楚 N: 'state of Chǔ'; V: 'to behave as appropriate to the state of Chǔ'

日	撻	而	求	其	楚
N	V		V	N	V
'day'	'to beat'	‹subord.›	'to seek'	'her/his'	'to behave as in Chǔ'

日撻: (N)-V→ V 'to beat daily'
而: ‹subordinating particle›
求: V 'to seek'
其楚: (N)-V→ N 'the situation that they behave as they should in Chǔ'

日撻: V 'to beat daily'
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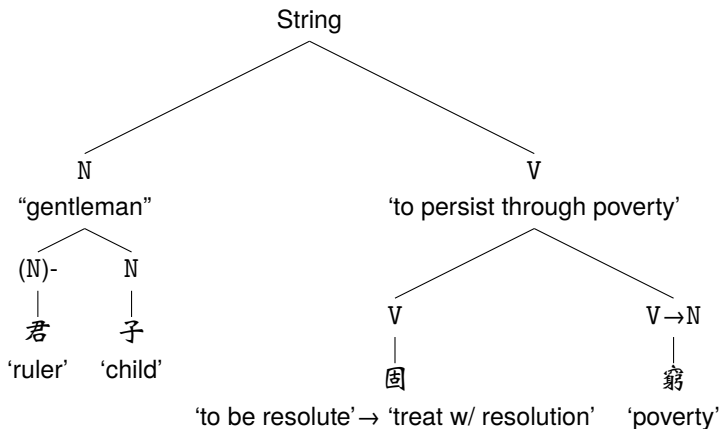求其楚: V N→ V 'to seek them to behave as they should in Chǔ'
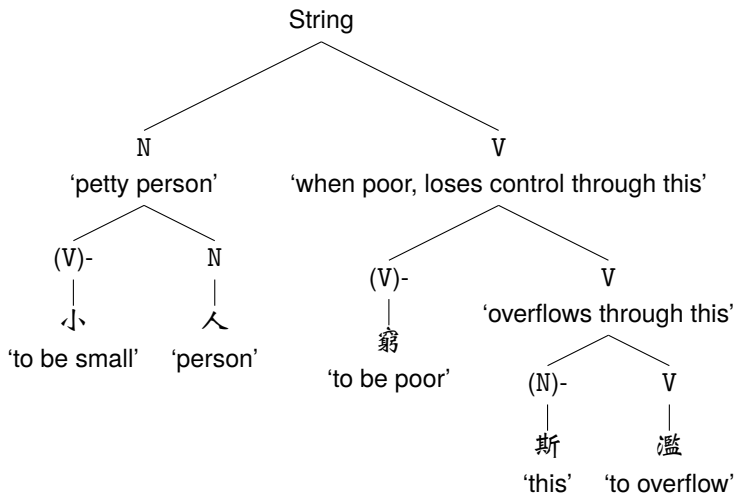
To want [your children] to behave as though in Chǔ, even if you beat them
daily... . (孟子 滕文公下)

The well-bred person persists through poverty… (*Analects* 15:2)

… the petty person, when poor, loses control because of it. (*Analects* 15:2)

Appendices

Prosody

An audience question: Why not analyze 日出於東 (slide 37) as 1 + 3?

String
'The sun appears in the east.' (禮記 祭義)

```
                          String
            N                          V
            |               'for the emergence to be in the east'
            日
           'sun'
                      V→ N                      V
                       |          'to be located in the east'
                       出
                   'emergence'          V              N
                                        |              |
                                        於              東
                                'to be located at'   'east'
```
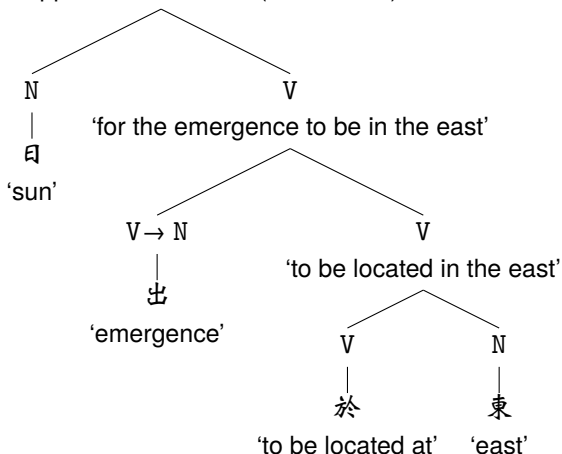
This is a legitimate reading, and it competes with the 2 + 2 reading as a "nonequivalent derivation"

But the *Lǐ jì* passage from which this line is taken is a hymn in four-syllable lines. Four syllable lines are the norm in very solemn writing, and are typically parsed in 2 + 2 meter,

This is an example of prosody (the organization of language by sound), something beyond the scope of a context-free to specify. But in the case of ambiguous analyses, we certainly have the right to choose the one that best fits other circumstances.

Following is the text of the three stanzas of the hymn.

Prosody, 3

Stanza 1

text	POS	2+2 analysis	translation
以朝及闇	V N V N	V V	From morning to darkness
祭日於壇	V N V N	V→ N V	to the sun we sacrifice on an altar;
祭月於坎	V N V N	V→ N V	in a depression we sacrifice to the moon,
以別幽明	(V)-V N N	V N	that we may tell darkness from light,
以制上下	(V)-V N N	V N	that higher and lower be paid fitting respect.

…

Stanza 2

text	POS	2+2 analysis	translation
祭日於東	V N V N	V→ N V	We sacrifice to the sun in the east;
祭月於西	V N V N	V→ N V	in the west to the moon we sacrifice,
以別外內	(V)-V N N	V N	that we may tell outer from inner thereby,
以端其位	(V)-V N N	V N	and that each may thereby be put in its proper seat.

…

Stanza 3

text		*POS*			*2+2 analysis*		*translation*
日出於東	N	V	V	N	V→ N V		The sun appears in the east;
月生於西	N	V	V	N	V→ N V		in the west is born the moon.
陰陽長短	N	N	N	N	N N		*yīn* and *yáng*, long and short,
終始相巡	N	N	(V)-V		N V		end and beginning follow one
							another

…

Appendices

Question: Are there any sentences that cannot possibly be analyzed using this system?

Response: I believe not, and would be glad to hear about counterexamples from readers.

Other audience questions, 2

Question: Mandarin looks as though it would obey these rules — is there something extra in Mandarin that can't be accounted for here?

Response: Mandarin grammar and word formation certainly incorporate all of these patterns. but there are structures that may require other rules.

An example is infixation — aspect particles between verbs and resultative suffixes: *zhàn* 'to stand up' vs. *zhànle qilai* 'to have stood up'; *tiào* + *wǔ* + *qilai* → *tiàoqi wǔlai* 'as for how one appears when dancing'

There is also diminution of the form *húzi* 'beard, mustache' or *chár* 'stubble of reaped rice plants' whose second morpheme (indicating dearness, smallness, or insignificance) is an abstraction but not in the narrow sense a grammar word — in Chinese terms, neither an "empty" nor a "full" word.

There is also a much clearer case in Mandarin that verbs of state display syntactic patterns distinct from verbs of action. Once we admit a POS "ADJ", it is more difficult to maintain that POS is completely indeterminate.

Definitely the

End 終