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de *in Mandarin*

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In Mandarin, there is an element *de* which has for years been the subject of analysis. Li and Thompson (1981) and Ross (1983 and 1984) have tried, with little success, to provide a unified treatment of this element. Li and Thompson (1981) claim that there are several *de*'s in Mandarin: a possessive marker, an adjectival marker and a nominalization marker. But the structural properties of these *de*'s and the similarities among them are ignored.

Using the Government and Binding framework (Chomsky 1981), I will provide an analysis which accounts for the structural and functional similarities and differences among the various *de*'s in Mandarin.[1] First, I will state the theoretical assumptions relevant to the discussion of *de*. Second, I will present the non-controversial evidence showing that *de* is a head-final complementizer in relative clauses. Third, I will present further data exemplifying a head-final *de* in other constructions. Fourth, I will demonstrate the impossibility of having a head-final *de* complementizer in resultative clauses. Finally, I will propose that there are two *de* complementizers in Mandarin, one head-final, the other head-initial.

1. *Theoretical Assumptions*

In this paper, I assume the X-bar schema in Chomsky (1986),

given in (1).

(1) a.   X′   b.   X″

(1a) tree diagrams
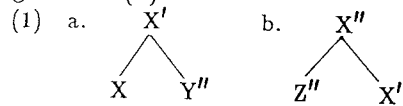
The X-bar schema holds of both lexical categories and non-lexical categories. The lexical categories are expressed in terms of the features $[\pm N, \pm V]$, in combinations specifying the categories noun $[+N, -V]$, verb $[-N, +V]$, adjective $[+N, +V]$ and preposition $[-N, -V]$. The non-lexical categories include complementizer and INFL. Y″ in (1a) is referred to as the complement of X, and Z″ in (1b) as the specifier of X.

Chomsky (1986) argues that all maximal categories are projections of their zero-level categories. Therefore, COMP is the head of S′, now the complementizer phrase C″; and INFL is the head of S, the INFL phrase I″. It should be noted that the linear order of the daughter nodes in the X′ schema is parametric; the order given in (1) is that proposed for English.

Huang (1982) proposed the following X-bar schema for Mandarin.

(2)   a. $[_{X_n}\ X^{n-1}\ YP^*]$ iff n=1 and X≠N

      b. $[_{X_n}\ YP^*\ X^{n-1}]$ otherwise

Example (2a) states that the category N does not branch to the left in the lowest expansion. Instead, the category N is strictly head-final. That is, the head branches to the right in both the final and the non-final expansions. On the other hand, for all other categories the head branches to the left on the final expansion and to the right on the non-final expansion. In other words, except for the category N, all X′-categories are head-initial in Mandarin.

In light of Chomsky's X-bar schema, the X-bar schema for Mandarin can be revised as in (3).

(3) a.   X′   b.   X′   c.   X″

(where X≠N)   (otherwise)
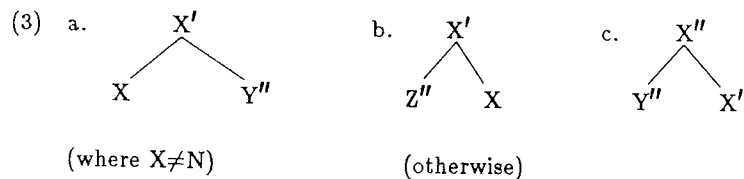
Moreover, I assume that Case assignment takes place under government. Government is defined as in (4):

(4)   Government
      $[\beta \ldots \gamma \ldots \alpha \ldots \gamma \ldots]$, where

      (i) $\alpha = X^0$
      (ii) where ∅ is a maximal projection, if ∅ dominates γ then ∅ dominates α.
      (iii) α c-commands γ. (Chomsky 1981:165)

The definition of c-command is stated in (5).

(5)   c-command
      α c-commands β if and only if β appears in every maximal projection that contains α. (Chomsky 1982:95)

Thus, in order to assign Case to an NP, a Case assigner must c-command the NP, and every maximal projection that dominates the NP must also dominate the Case assigner.

Case is assigned to NPs governed by and adjacent to a Case assigner by virtue of the configuration in which they appear. Case then percolates to the head of the NP. A Case assigner is a $[-N]$ element. Thus, verbs, prepositions and INFL $[+tense]$ are Case assigners. Case is assigned to the subject of a sentence by INFL $[+tense]$ while objects of either a preposition or a verb are normally assigned Case by the adjacent preposition or verb.

2. de *as a Complementizer in Relative Clauses*

In sentences (6) to (8), the structure in which *de* occurs is straightforward.

(6)   [Wo xihuan de ren]$_{NP}$ hen   chengshi
      I   like   person   very   honest

      'The person that I like is very honest.'

(7)   [Ni   kanjian de neige ren]$_{NP}$ shi Zhangsan
      you   see   that person   be   Zhangsan

      'The person that you see is Zhangsan.'

(8)   Wo xihuan [Zhangsan mai de che]$_{NP}$
      I   like   Zhangsan buy   car

      'I like the car that Zhangsan bought.'

Sentences (6) to (8) are examples of relative clauses in Mandarin. *de* in these relative clauses is not a marker as Ross (1983) states but rather a complementizer, as argued by Huang (1982). Following the X-bar schema stated in (3), sentence (6) has the tree structure in (9):

(9)   Tree Structure for (6)
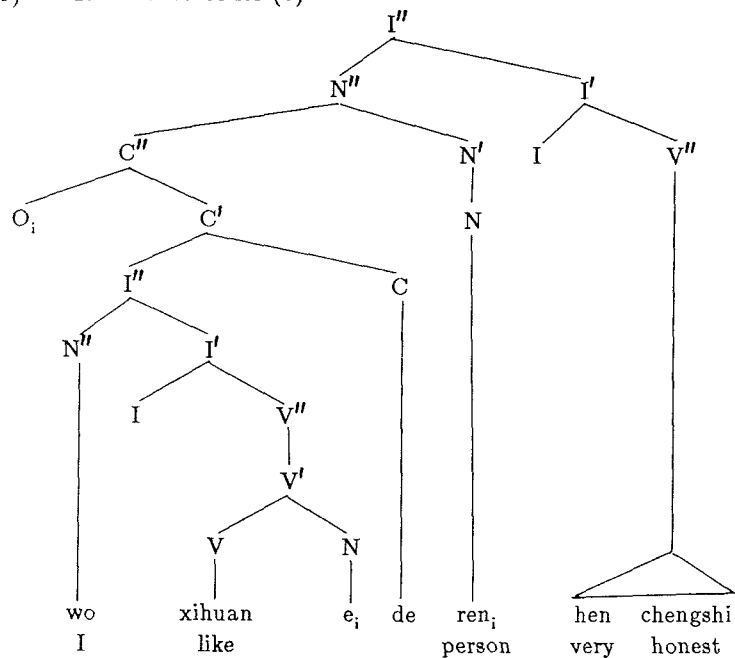
'The person that I like is very honest.'

The complementizer *de* is head-final a d takes an INFL phrase as its complement. The INFL phrase modifies the NP *ren* 'person' in (9). The empty category in (9) is a Case-marked operator trace. It is coindexed with the operator in the specifier position of COMP which is in turn co-indexed with the NP *ren* 'person'.

3. *The Wide Distribution of* de

From the structure (9), it is clear that *de* is a complementizer. The question I would like to raise here is whether *de* in other structures is also a complementizer. Li and Thompson (1981) describe many *de*'s and treat them all as markers of some sort, but they do not take into consideration the structural and functional similarities of the various *de*'s. Now let us examine the possibility of reanalyzing all the *de*'s as complementizers. First, consider the functional similarities among the *de*'s in the following sets of data, which show the wide distribution of *de* in Mandarin:

(10)   NP + de
     a. [Zhangsan]$_{NP}$ de fanzi
        Zhangsan   house

        'Zhangsan's house'

     b. [wo]$_{NP}$ de qian
        I   house

        'my money'

In (10a), the noun phrase preceding *de*, *Zhangsan* modifies the noun 'house' following *de*. Similarly, in (10b), the noun phrase *wo* 'I' modifies the noun *qian* 'money' which follows *de*. In other words, the noun phrase preceding *de* is the possessor and the noun following *de* is the possessed.

In (11), *de* has a preceding adjectival phrase or verb phrase.[2]

(11)   AP/VP + de

     a. [kuai-le]$_{AP/VP}$ de ren
        happy   person

        'a happy person'

     b. [cheng-shi]$_{AP/VP}$ de nuhai
        honest   girl

        'an honest girl'

[2] The distinction between adjectives and verbs in Mandarin is not clear-cut.

In both (11a) and (11b), the adjective/verb modifies the noun following de. In other words, we find the same modification relationship between the element preceding de and the element following de in (10) and (11).

Now consider the sentences in (12):

(12)   PP + de

     a.   [Ta   dui   wo]pp de taidu   hen   hao
         he   to   me   attitude   very   good

         'His attitude towards me is very good.'

     b.   [Ta   dui   Zhangsan]pp de liaojie   hen   shen
         he   to   Zhangsan   understand   very   deep

         'His understanding of Zhangsan is very deep.'

In (12a), the prepositional phrase preceding de modifies the noun following de. Similarly, in a nominalization structure such as (12b), the prepositional phrase ta dui wo 'he to Zhangsan' modifies liaojie 'understanding'.

In (13), we see further examples of de taking an INFL phrase. The INFL phrases in (13) are not relative clauses as in (6) to (8):

(13)   non-relative IP + de

     a.   CP[[Zhangsan   zou]IP de] hen   qi-guai
         Zhangsan   walk   very   strange

         'Zhangsan walks strangely.'

     b.   [Ta   lai]IP   de hen   kuai
   he   come   very   fast

         'He comes fast.'

The main verb of the sentence in (13a) is qi-guai 'strange'. Thus, the subject of the sentence is sentential. The sentential subject Zhangsan zou 'Zhangsan walks' is an argument of the entire verb phrase qi-guai 'strange'. Example (13b) shows a similar phenomenon. The verb kuai 'fast' takes a sentential subject ta lai 'he comes'.

From (10) to (13), it is clear that there are functional similarities among these de's. As Ross (1984) states, de always occurs between the modifier and the head. Therefore, the possibility arises that de in the above sentences is the same de. In other words, given the fact that all the de's in (10) to (13) indicate simple modification or predication, we would prefer to treat de in the above sentences as a single element, a complementizer. It should be noted that the X-bar schema proposed by Chomsky (1986) allows exactly this kind of complementizer. That is, a complementizer, being a head, may or may not select a particular type of complement or specifier. English is an example of a complementizer selecting only I″ as its complement.

Examples (6)–(8) and (10)–(13) show that de, if it is a complementizer in Mandarin, places no restrictions on the category of its complement. Consider the structure (14) for (10a) and (10b):

(14)
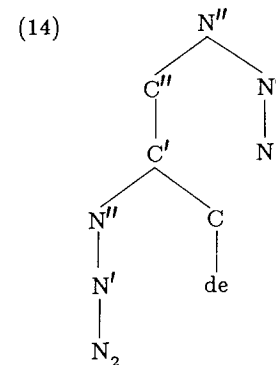
Example (14) shows that de takes a noun phrase as its complement in both (10a) and (10b). The complementizer phrase (C″) in (14) is in the specifier position of N″. The whole complementizer phrase modifies the head noun. Moreover, as indicated in section 1, Case is assigned to an NP and percolates to the head of the NP. In (14), N_1 is the head and therefore gets Case from a governing [−N] category (INFL or verb). The question which arises is how N_2 gets Case. Given structures such as (14), I assume that de in Mandarin is also a Case assigner and thus assigns Case to N_2 in (14).[3]

Consider the following structure for the NPs in (11):

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[3]Having complementizers as Case assigners is not without precedent. The complementizer for in English assigns Case.

(15)

```
              N''
            /    \
          C''     N'
          |
          C'
         /  \
    AP/VP    C
             |
             de
```
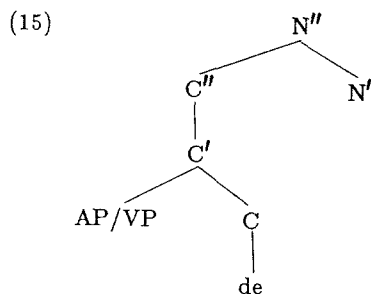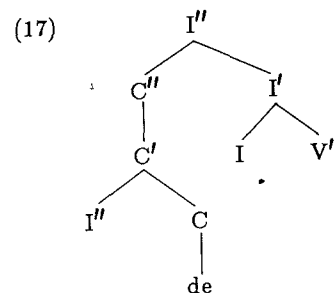
Example (15) shows that *de* can also take an adjectival phrase or verb phrase as its complement. Again, the complementizer phrase is in the specifier position of N'' and it modifies the head noun.

(16)

```
                N''
              /    \
            C''     N'
            |       |
            C'      N₂
           /  \
         P''    C
        /  \    |
      N''   P'  de
      |    /  \
      ta  P    N''
               |
               N₂
```
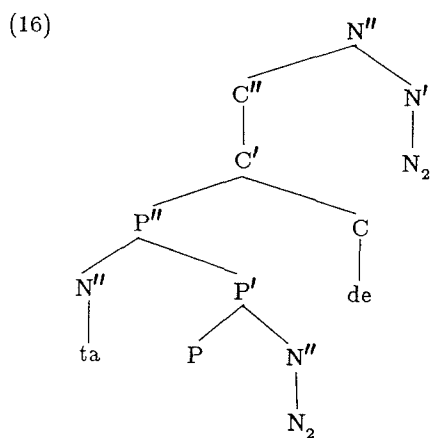
Example (16) further shows that *de* also takes a prepositional phrase as its complement. It should be noted that in both (12a) and (12b), the NP *ta* 'he' is not in the specifier position of N''. Instead, it is in the specifier position of P'' as indicated by (16). Since Case percolates to the head, the Case assigned by INFL to the whole NP would percolate to the N_1. If the NP *ta* 'he' were in the specifier position of N'', it could not receive Case. In the specifier position of P'', *ta* can receive Case from *de*, a Case assigner in Mandarin,

through government to specifier position (Cowper, 1987).[4] Hence, *ta* must be in the specifier position of P''. Example (16) also shows that C'' in (12a) and (12b) is in the specifier position of N''.

Example (17) shows the structure for sentences (13a) and (13b):

(17)

```
              I''
            /    \
          C''     I'
          |      /  \
          C'    I    V''
         /  \
      I''    C
             |
             de
```

In the sentences in (13), as (17) indicates, C'' is in the subject position and *de* here takes an I''.

We have seen that only one *de* is necessary to account for the data so far. The above show that *de* is a head-final complementizer that does not select any particular category of complement. In other words, the structure of all the complementizer phrases discussed so far is the one in (18).

(18)

```
        C''
        |
        C'
       /  \
     X''    C
            |
            de
```
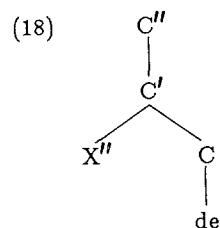
Example (18) shows that the final expansion of *de* branches to the right, and the category of X'' is unrestricted.

Given that we have only one complementizer in all the above sentences, it follows that all the *de*'s in (6)–(8) and (10)–(13) are

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[4]The Case feature which *de* assigns is available, since the complement of *de*, being a PP, does not require Case.

functionally similar. That is, from the structure of the complementizer phrase, we can predict the functional relationship between the complement of *de* and the head element modified by or predicated of the complementizer phrase.

4. de *in Resultative Clauses*

Besides indicating modification, *de* also appears in sentences which indicate a cause-result relationship. Sentences (19) to (21) are examples of *de* in resultative clauses.

(19) Ta xi   yi-fu   xi   de hen   gan-jing
      he wash   clothes   wash   very   clean

      'He washed the clothes and they are very clean.'

(20) Ta qi   ma   qi   de hen   lei
      he ride   horse ride   very   tired

      'He went horse-back riding and he became tired.'

(21) Wo pao-bu pao de hen   re
      I   run   very   hot

      'I went jogging and I am very hot.'

Example (19) indicates that the result of his washing the clothes is that they are very clean. The clause 'his washing the clothes' here does not modify 'clean'. Instead, 'clean' is the result of the washing of the clothes. Therefore, the relationship between the element preceding *de* and the element following *de* is different from the one in (6)-(8) and (10)-(13).

In (20), *ta qi ma* 'he went horse-back riding' does not modify *lei* 'tired'. Instead, 'tired' modifies 'he'. Similarly, in (21), *wo pao-bu* 'I went jogging' does not modify the sentence 'I am hot'. Instead, 'I am hot' is the result of jogging. We might attempt to use the same structure for sentences such as (19), on the assumption that there is only one *de* in Mandarin, the head-final *de* that has been identified above. Thus the structure of (19) would be (22a):
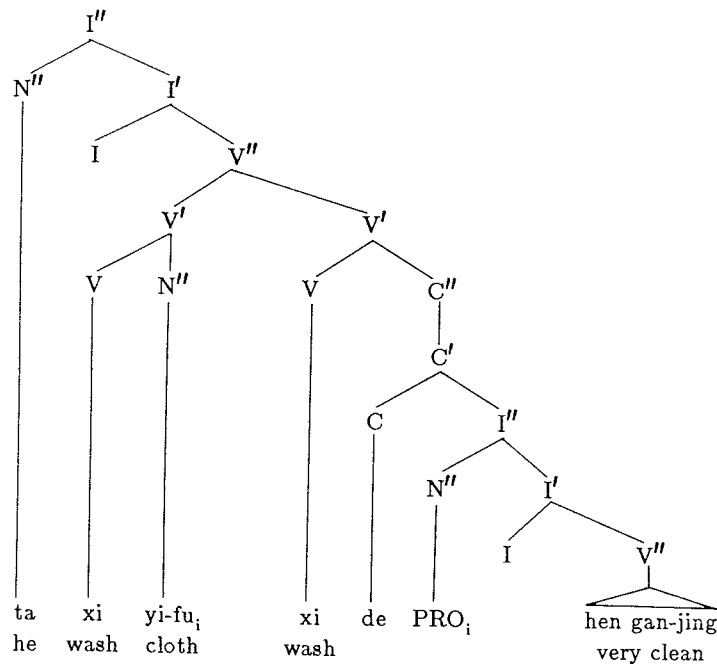
(22)   a. Head-final *de*
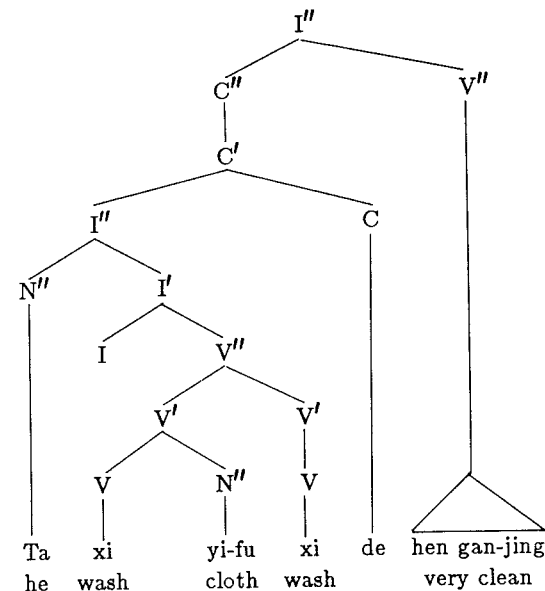
'He washed clothes and they became clean.'

However, there are two major problems with (22a). First, this structure treats *gan-jing* 'clean' as the main verb. Second, it makes the claim that verbs like *gan-jing* take a clausal subject. These not only fail to give the right interpretation of the sentence, but also create other undesirable consequences. From the structure (18), we predict that the INFL phrase 'he washed the clothes' is an argument of 'clean'. However, the verb 'clean' here is not predicated of the process of washing. Instead, it modifies the NP 'the clothes'. Given (22a), the correct modification relationship cannot be predicted. Therefore, (22a) cannot be the correct representation of the resultative clauses.

On the other hand, if we propose a head-initial complementizer *de*, the structure makes the correct predictions. Consider (22b) as the structure for (19):

(22)   b. Head-initial *de*

```
                    I″
                  /    \
                N″      I′
                      /    \
                    I        V″
                           /    \
                         V′      V′
                        /  \    /   \
                      V    N″  V    C″
                                    |
                                    C′
                                   /   \
                                  C     I″
                                      /    \
                                    N″      I′
                                           /   \
                                          I     V″
```

ta   xi   yi-fu$_i$ xi   de   PRO$_i$ hen gan-jing
he   wash cloth   wash   very clean

‘He washed the clothes and they are very clean.’

In (22b), *xi* ‘wash’ is the main verb and *gan-jing* ‘clean’ modifies
PRO which is coindexed with *yi-fu* ‘the clothes’. From structure
(22b), it is clear that the clothes are washed and that the clothes are
clean. Similarly, in both (20) and (21), the verb that indicates the
result modifies the subject of the higher clause. The interpretations
of the sentences thus are accounted for by (22b).

Consider now the internal structure of the embedded *de*-clause.
In sentences (19)–(21), the subject of the embedded clauses is PRO
since the subject slot can be filled by lexical NPs (cf. Huang 1982),
as in sentence (23):

(23) Mali   ku   de [wo hen   nan-guo]
      Mary   cry   I   I very   sad

      ‘Mary cried and that made me very sad.’

Example (23) shows that lexical NPs such as *wo* ‘I’, can fill the slot
of the subject position. The subject position of the embedded *de*-
clauses thus must be governed. PRO therefore cannot fill the position.
Since lexical NPs and PRO can fill the subject position, the question
being raised is whether the subject receives Case from INFL. In other
words, is the embedded *de*-clauses [+tense] or [−tense]? Following
Huang (1982), I use *hui*, the tense marker for future, to illustrate the
finiteness of the embedded clauses, as in (24).

(24)   *Ta xi   yi-fu . xi   de [hui   hen   gan-jing]
        he wash clothes wash   FUTURE   very   clean

       ‘He washes the clothes and they will be very clean.’

From the ungrammaticality of (24), we argue that the embedded
clauses in (19)–(21) are also non-finite. The subject in the embed-
ded clauses cannot be Case-marked by INFL. On the other hand, as
indicated in section 3, *de* assigns Case. If we assume that head-initial
de shares the Case-marking properties of head-final *de*, we can say
that in sentences (19)–(21), *de* governs the subject in the embedded
clauses and assigns Case to the subject.

Given a structure like (22b) which has a head-initial *de*, we can
anticipate the functional differences shown in (19)–(21), described
above. Further, the structure can account for the proper interpreta-
tion of the sentences.

5. *Conclusion*

I conclude that there are two homophonous *de* complementizers
in Mandarin Chinese. I will call them *de*$_1$ and *de*$_2$. *de*$_1$ is strictly
head-final and takes any maximal projection (Xmax) of any category
as its complement. *de*$_2$ is a head-initial complementizer, taking only
I″ in resultative clauses.

The complement of *de*$_1$ modifies the head element, but *de*$_2$ does
not introduce a simple modification relationship. Instead, it indi-
cates a cause-result relationship. Thus, *de*$_1$ and *de*$_2$ are different in
function, structure and meaning.

Given *de*$_1$ in Mandarin, Huang's X-bar schema needs to be re-
vised. That is, in addition to the category N, COMP can also be

strictly head-final. Since COMP is a non-lexical category, Huang's X-bar schema still holds for all lexical categories in Mandarin. However, COMP does not have a uniform structure. de_1 follows the schema in (3b) and branches strictly to the right. de_2 follows the schema in (3a) and branches to the left in the lowest expansion.

This analysis clearly shows that a single category in a language may be both head-initial and head-final. The choice will be determined by the particular lexical item.

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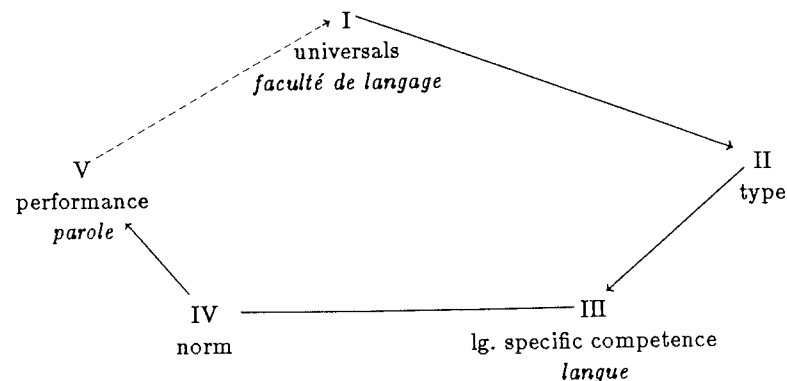# Review Article:
Two Aspects of Morphological Naturalness

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1. *Introduction*

In his programmatic outline of the theory of Natural Morphology, Dressler (1985:322) proposes this "quintuple":

The two books under review may be integrated into such a scheme as follows: Mayerthaler treats (I) exclusively, proposing principles