Is syntax really phonology-free?*

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Abstract

This paper argues, first, that the hypothesis of 'phonology-free syntax' is incorrect, based on the P-invalidated syntactic structures and P-activated syntactic operations in Chinese. Secondly, it is shown that syntax must have access to prosody so that the NSR can rule out legitimate syntactic operations in P-syntax.

1. Introduction

It has traditionally been believed that syntactic processes should not, in principle, be allowed to refer to phonological properties. This is known as "Phonology-free Syntax" (Zwicky 1969, Zwicky and Pullum 1986), stated as follows (Kager and Zonneveld 1999):

> **The Principle of Phonology-Free Syntax**
> No phonological information is available to the syntax.

In this paper, it is argued that the principle of "Phonology-free syntax" is viable only if 'phonology' is understood in a traditional way, because there are no rules in the languages of the world that front a syntactic constituent just because its first syllable is marked with a high vowel or high tone. However, the "Phonology-free syntax" is incorrect when phonology is understood in terms of prosody, because prosody, as shown in this paper, not only determines but also motivates relevant syntactic outputs (Feng 1995, 2000). The V(erb)-R(esultative), the [[V(erv)-O(bject)] NP] and the [[V-Locative pronoun]] O(bject)] constructions discussed in this paper show clearly that it is prosody that determines whether [V-R], [V-O] and [V-PP] can take a postverbal object or not. Thus, syntax is not totally phonology-free (prosody is part of phonology). Given the facts and arguments in this paper, the hypothesis that phonology does not have any influence on the bulk of syntax given in Guasti and Nespor 1999 can no longer be upheld.

2. Arguments for Phonology-Free Syntax

Let us begin with the arguments for phonology-free syntax. The hypothesis of phonology-free syntax is based, essentially, on the following three types of arguments:

2   (1) Some of the phonologically determined syntactic phenomena are extra-grammatical factors, not rules of grammar;

          (2) Some of the phonologically determined syntactic phenomena are merely an alternative Choice between two structural rules;

          (3) Some of the phonologically determined syntactic phenomena are stylistic or pragmatic alternations, not syntactic structures

In what follows, I will elaborate each of the arguments and argue that, although the analyses given in previous studies may be true in certain cases, the hypothesis of 'phonology-free syntax' cannot be upheld as far as the data presented in this paper is concerned. Note that phonology (or more specifically, prosody) may not be able to create syntactic structures; however, it does not mean that prosody cannot block legitimate syntactic structures and activate potential syntactic operations. As seen below, the P-Blocking Effect (prosody invalidates syntactic operations) and the P-Activating Process (prosody motivates otherwise nonexistent syntactic movements) are both active in Chinese. It follows that syntax must make reference (or have access) to prosody in order to produce well-formed sentences both syntactically and prosodically in the language. If this is so, the hypothesis of phonology-free syntax must be modified accordingly.

2.1 Extra-grammatical factors are not rules of grammar

Pullum and Zwicky (1988), Nespor and Vogel (1988) have argued that the phenomena of the so-called phonology influencing syntax (P-Syntax, henceforth) are actually subject to the following factors:

3.   a. spurious generalizations;

        b. not a rule but a preference or tendency;

        c. not a rule but an extra-grammatical factor;

        d. morphological rather than syntactic;

        e. a universal phonological constraint that need not be stated in the rule;

        f. a low-level effect of restructuring.

Although the so-called P-Syntax cases discussed in Pullum and Zwicky (1988) and in Nespor and Vogel (1988) may be due to one of the extra-grammatical factors listed in (3), examples given in this paper show clearly that the P-syntax phenomena in Chinese are not extra-grammatical but must be stated in terms of rules of grammar. For example, the fact given in (7) show clearly that only disyllabic VO compounds can take an outer object and all trisyllabic ones cannot do so. The inability for all trisyllabic VO compounds to take an outer object must be considered as a rule (hence a part of the grammar) and this cannot be done without making reference to the number of syllables (prosody). As a result, the P-syntactic rules like this (see section three for detailed discussion) cannot be viewed as extra-grammatical factors, simply because they are the rules of grammar.

2.2. Alternative Choices are not structural rules

Different from the consideration of P-syntax as extra-grammatical factors, Golston (1995) argues that prosody can rules out an ill-formed sentence only if it has an alternative one and the ill-formed sentence will be saved only if there is no such alternative. However, the following examples show that it is not always the case.

4. a   *zhongzhi hua   b.   xi.huan hua
        plant flowers   like flowers

    c   hai.pa gui   d.   pa gui
        be scared to ghost   be scared to ghost

It is well-known that 2+1 VO forms in Chinese are generally unacceptable (see examples (5)). Given the assumptions of Alternative Choices, if *hua* lacks a disyllabic counterpart and is hence acceptable in (4b), it is unclear why (4a) is ungrammatical. If *zhongzhi* has a monosyllabic counterpart *zhong* 'plant,' hence an alternative, *zhong hua* 'plant flowers,' is the only choice. (4c) then should not be grammatical because *haipa* also has a monosyllabic counterpart *pa* as in (4d). However, (4c) is perfect. On the other hand, in both *hai.pa* and *xi.huan*, the second syllable is neutralized, suggesting that syllable neutralization (or reduction) may be a crucial factor here (see below). Nevertheless, the argument against P-syntax given by Golston is not valid as far as the data presented here are concerned.

2.3. Stylistic and pragmatic alternations are not syntactic structures

Guasti and Nespor (1999) agreed that some syntactic constructions that involve different orders of words are influenced by phonology. They argued, however, that phonology in these cases does not rule out a structure generated by syntax, but only determines a choice between alternatives according to criteria that are either stylistic or related to discourse requirements. Thus, syntax is phonology-free, because phonology cannot affect the grammar though it influences the word order.

There are at least two problems with this analysis. Empirically, it is not true that prosody cannot rule out a structure generated by syntax, as we have seen before and will see more lately. Theoretically, word order (of phrases) is syntax in the sense that all kinds of word orders must be permitted (if not motivated) by syntax. It is hard to conceive that some of the word orders of natural language are not permitted by syntax (or UG). What must be distinguished is the differences between existing structures (word orders) generated in syntax and potential structures (word orders) permitted by syntax; and the differences between operations motivated in syntax and those activated by other factors (prosody, semantics and pragmatics). Thus, syntactic operations motivated by other factors do not mean that such operations are not syntactic. Theoretically, no factors --- semantic, pragmatic and prosodic --- can create a word order that is not allowed by syntax (potentially). As a result, even though the examples that Guasti and Nespor have discussed may be really, the data in Chinese shows a complete different scenario.

3. Evidence for Prosodic Syntax (Prosody » Syntax)

In Chinese syntax it has been observed (Lü 1962, Lu 1989, Wu 1989, Lu and Duanmu 1991, Feng 1991/2000, Dong 1998, and many others) that the verb+object and

verb+resultative constructions are not formed freely in syntax and they must be constrained by prosody as well. The prosodically constrained VO and VR forms can be summarized as follows.

First, a VO or VR combination is unacceptable if the verb contains two syllables while the complement (i.e., the object or the resultative) consists of only one syllable. For example (the single V and double VV stand for monosyllabic and disyllabic verbs, respectively; R and O indicate monosyllabic resultative and object complements with RR and OO for disyllabic complements):

5   **[VV R]**   **[V R]**
     *bai-fang   ping   bai ping 'arrange flat'
     arrange-put flat   fang ping 'put flat'

     [VV O]   **[V O]**
     *zhongzhi shu   zhong shu 'plant trees'
     plant-plant tree   zhi shu 'plant trees'

The fact is very clear: only disyllabic VR and VO forms can be formed freely in the language while VVR and VVO forms are generally not allowed. The ungrammaticality of the [2+1] forms creates a phrasal paradigm gap among all possible VR and VO structures. For example:

6   1+1(σ+σ)   1+2(σ+$\sigma\sigma$)   2+1($\sigma\sigma$+σ)   2+2($\sigma\sigma$+$\sigma\sigma$)
VR   xie tong xie tongshun   *shuxie tong shuxie tongshun
     write smooth   write smooth   write smooth   write smooth

VO   zhong shu   zhong guoshu   *zhongzhi shu   zhongzhi shumu
     plant trees   plant fruit trees   plant trees   plant trees

All other possible syllable-combinations are perfectly grammatical but the VVR and VVO. The ungrammatical VVR and VVO forms cannot be properly explained in terms of syntax, simply because syntax does not operate on a number of syllables. It is not caused by semantics either, because there is no reason why disyllabic verbs cannot take monosyllabic objects while a monosyllabic verb can take a disyllabic object, if disyllabic and monosyllabic counterparts are semantically (or stylistically) different, for which a semantic account would probably argue. The only plausible explanation is prosody, because the ban on constructing a [2+1] (VVR/VVO) form is syllabically conditioned. Hence it is the prosody that prohibits the VVR/VVO from appearing in the language.

Second, there is another prosodic-syntactic parallelism between the VR and VO forms in the language. That is, both VRR and VOO cannot take post-verbal objects. For example:

7   *[VRR NP]   [VR NP]
     *da laogu jichu   da-lao jichu
     hit solid foundation   hit solid foundation
     'To make the foundation solidly.'

     *fang pingwen chabei   fang-ping chabei
     put steady   cup   put steady cup

'To put the cup steadily.'

*[VOO NP]   **[VO NP]**
*fu   zeren   jiaoxue   fu-ze jiaoxue
take responsibility teaching   take responsibility teaching
'To take the responsibility of teaching.'

*kai   wanxiao ren   qu   xiao ren
 make joke   person   take joke person
'To crack a joke to someone.'   'To make fun of someone.'

Of course, the VRR and VOO are different in the sense that VRR forms may be analyzed as compounds while the VOO are phrases. However, this difference will not constitute the reason as to why VRR and VOO cannot take post-verbal objects. The contrast between *[VRR NP] and [VR NP] on the one hand and the *[VOO NP] and [VO NP] on the other, shows clearly that it is prosody that matters here. Simply because neither syntax nor semantics would explain the parallel grammaticality with the parallel prosody, as shown below:

8        $*[V [\sigma\sigma]_{RESULTATIVE} NP]$ = $*[V [\sigma\sigma]_{OBJECT} NP]$

         $[V [\sigma]_{RESULTATIVE} NP]$ = $[V [\sigma]_{OBJECT} NP]$

This parallelism can only be explained in terms of prosody. That is to say, it is prosody that rules out the $*[V [\sigma\sigma]_{RESULTATIVE} NP]$ and $*[V [\sigma\sigma]_{OBJECT} NP]$ structure in a parallel fashion and it is also prosody that allows $[V [\sigma]_{RESULTATIVE} NP]$ and $[V [\sigma]_{OBJECT} NP]$ to be grammatical. Otherwise, there is no reason why the grammaticality of the disyllabic VR forms should behave the same as that of disyllabic VO forms, and the acceptability of trisyllabic VOO forms should also be the same as that of trisyllabic VRR forms, when an outer object is involved. The third parallelism between these two structures is this:

9   **[V.v R]**[1]   **[V.v O]**
         ma.sa ping   ma.sa bu
         stroke flat   stroke cloth

         qi.fu ku qi.fu ren
         bully crybully people

The above examples show that it is not always true that VVR and VVO are unacceptable. However the acceptable VVR and VVO forms given above are different from the ones we saw before (). It is clear that in each of the VV disyllabic verbs above, the second V is neutralized (with a vowel reduction and without a tone, marked by a dot before the

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[1] There are different types VVR forms that must be distinguished form the ones given here. For example:

         anzhuang-hao/wan   *anzhuang-wen
         install-well/finished   install-steady

As it well-known, a group of verbal final particles derived from verbs or adjectives can co-occur with disyllabic verbs, such as -*hao* 'good', -*wan* 'finish'...etc. Obviously, they are functional (or semi-functional) elements what must be distinguished from lexical resultative adjectives, as argued in Xue (1985) and Dong (1998).

V(erb): .V). In other words, even if a VV cannot take R or O as its complement, a V.V could do so. This parallelism can be formulated as follows:

10   *[VV R] = *[VV O]
        [V.V R] = [V.V O]

All the facts given above indicate that the ill-formed verb+resultative and the ill-formed verb+object forms are not syntactically, but prosodically ill-formed; hence they are prosodically constrained syntax, in the sense that prosody rules out a well-formed structure generated by syntax, i.e., Prosody » Syntax.

4. Is Prosodic Syntax merely a Filter Operation?

The standard explanation for obvious phonological influence on syntax is known as the Filtering model (Ross 1967), which implies that both components (phonology and syntax) operate independently. The 'filter' serves as a model that can capture the influence of a 'later' component on an 'earlier' one. However, this operation is incapable of capturing prosodic constraint on syntax, though it could capture lexical prosodic constraints (Zec and Inkelas 1990), as shown in (11).

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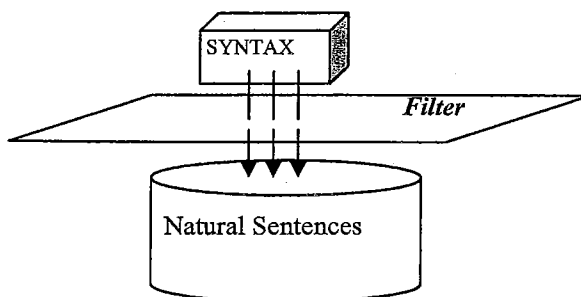
Of course, although a filtering operation might be one way to account for some of the data discussed in the literature, it is not the only way (see Feng 2002). The real question for the P-syntax operation is, as Kager and Zonneveld (1999) put it, whether there is a bidirectionality of information passed back and forth between syntax and phonology through the interface. Although it is still premature to give a completed answer to this question, an argument for bidirectionality can be made if there are structures that meet the following two conditions:

12   (a) the grammaticality of those structures must be accounted for by prosody, and
        (b) the prosodic process must be operated in syntax, not in the PF.

In other words, if there are facts that can only be accounted for by prosody operating in syntax, it becomes a corollary that syntax must have access to prosody, and there is, therefore, a bidirectional interface between syntax and phonology. As seen below, the evidence suggests strongly that this is the case. Considering the following examples:

13 a.   [V-R   Object]$_{V'}$ b.   [V-O   Object]$_{V'}$
        da-lao   jichu   jiang-xue   Beishida

          hit-solid foundation   talk-academics   Beijing   Normal
University
          'make foundation solidly'   'give lectures in BNU'

     a'. *da-laogu jichu   b'. *jiang-yuyanxue Beishida
          hit-solid foundation   talk-linguistics   Beijing   Normal
University
          'make foundation solidly'   'give linguistic lectures in BNU'

As seen above, only disyllabic VR and disyllabic VO can take an outer object, while
trisyllabic VRR and trisyllabic VOO cannot take an outer object in general. This is an
obvious prosodic constraint on the syntactic construction, which can be formulated as
follows:

14   **MinWd Condition on V' Structures**[2]
        VR/VO: [[__]$_{MinWd}$ NP]$_{V'}$

The MinWd Condition says that within the V', a VR or VO form can take a NP as its
complement only if it is a minimal word. Now, given the MinWd Condition, both *[VRR
NP] and *[VOO NP] structures are ruled out prosodically. The next question is where they
can be ruled out. Obviously, they cannot be ruled out in the lexicon because there is nothing
wrong with each of the three: the verbs, the adjectives and the objects. Are the ill-formed
syntactic structures ruled out in syntax or at PF? Actually, it is a question of whether the
MinWd Constraint functions as a filter or not. Of course, if the ungrammatical [VRR/VOO
NP] forms cannot be ruled out by a filter operation, the MinWd Condition must be
considered a constraint operating in syntax. Now we must decide where the operation of
MinWd Condition precedes (at PF or in syntax). Actually, the following facts are sufficient
to show that the prosodically ill-formed sentences in (7) cannot be ruled out by a filter.

15   NP$_i$...[V RR t$_i$]$_{V'}$ NP$_i$...[V OO t$_i$]$_{V'}$

          jichu, ta da-laogu le   zai Beishida, ta jiang yuyanxue
          foundation, he hit-solid   at BNU,   he talk linguistics
     'As for foundation, he laid solidly'   'In BNU he gave a lecture in linguistics.'

There are several reasons that the grammaticality of *[VRR/VOO NP] cannot be ruled out
by a filter. First, the grammaticality cannot be explained at PF by a filter. The problem for a
filter analysis is this: the VRR and VOO forms are both well formed and hence cannot be
ruled out in the language. In other words, what must be ruled out here is not individual
lexical items, but a syntactic structure ([VRR NP] or [VOO NP]) where a specific lexical
item (the complement R or O) with a prosodic shape (disyllabic). That is to say, the MinWd
Condition is not operable if the outer object NP in [[__]$_{MinWd}$ NP]$_{V'}$ is not present (see
example given in (15)). Obviously, it is impossible for a phonological (or prosodic) filter to
rule out a syntactic structure only because it has an outer object, even if the whole structure
is prosodically ill formed.

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[2] The minimal word (MinWd, henceforth) can be defined as follows. (see Feng 2000/2001):
        MinWd Definition
A minimal word in Chinese is a foot formed by two syllables, that is: MinWd = foot ([σσ]).

The second reason concerns the inherent property of the filter itself. It is natural for a filter to capture lexical prosodic constraints, but it is impossible for such an operation to capture prosodic constraints on syntactic structures where three elements (a verb with two complements) are involved and none of them is ill formed. This is so because when a filter operation applies at PF, all syntactic information, including the information about the relationships among the three, will have been lost. If there is no syntactic information available to the Filter, how can the Filter recognize the complement that must be ruled out? Since there is no way for a filter to identify which complement to be ruled out, a filter process would not work here at PF.

Of course, one may argue that the VR and VO are compounds so that the constraint is really a prohibition of trisyllabic VRR and VOO from co-occurring with an outer object. Even if this may work like a filter, there is no reason for the existence of such a filter. More specifically, why cannot a trisyllabic VRR or VOO compound take an outer object and why can only disyllabic VR and VO take an outer object? A filter operation cannot answer this question. Thus, it remains a mystery in the language as to why there is such a filter. As a result, a filter hypothesis gives no explanation about the mechanism of the grammar but offers only a puzzle as to why there should be a filter.

5. The availability of prosodic information to the syntax

As seen above, a filter hypothesis cannot answer why VRR (or VOO) fail to take an outer object, thus, the question why [VRR NP] and [VOO NP] are ungrammatical remains as a mystery under this analysis. This result is actually expected because the [VRR NP] is a prosodically ill formed syntactic structure, rather than a prosodic constraint on the lexicon. Since a PF (prosodic) constraint works only for metrical relations but not syntactic relations, a PF filter cannot properly control prosodically constrained syntax. Thus, in order to capture syntactic relations, prosody must be available to syntax. How could that be? There are two possibilities I would like to propose. First, it is possible because NSR, as proposed in (Feng 2001), must apply in syntax.

16   **G-NSR (in Chinese)**

Given two sister nodes C1 and C2, if C1 and C2 are selectionally ordered (see footnote 5), the one lower in selectional ordering and containing an element governed by the selector is more prominent.
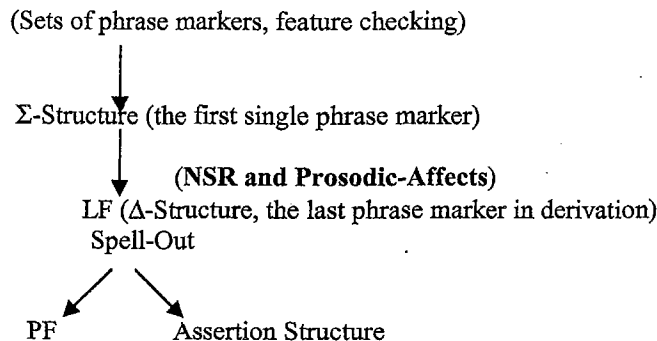
The NSR in Chinese is government-based (hence G-NSR) and the notion of Government is defined in the following manner:

17   **Government**
α governs β if and only if
(a) α is an X^0, and
(b) α c-commands β, and
(c) every branching node dominating α dominates β.

The second possibility of prosody available to syntax comes from the component where the NSR applies. Following Zubizarreta (1998), I propose that the NSR is operational within the architecture of the model given in (18).

18   (Sets of phrase markers, feature checking)

                            ↓

        Σ-Structure (the first single phrase marker)

                            ↓

                            (NSR and Prosodic-Affects)
        LF (Δ-Structure, the last phrase marker in derivation)
        Spell-Out

                    ↙   ↘
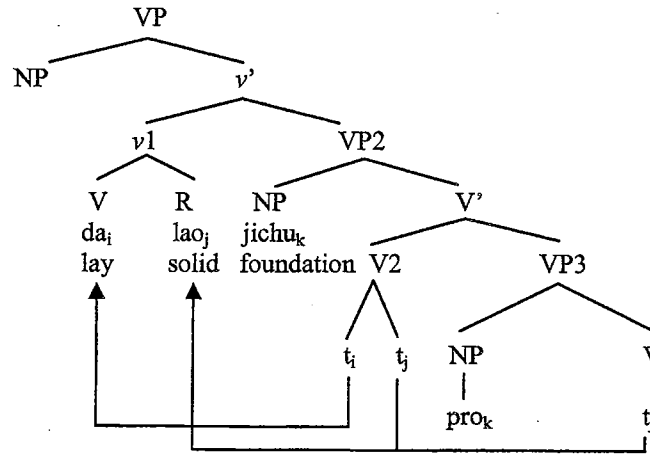
        PF   Assertion Structure

That is, the NSR applies before Spell-Out. Hence, it is sensitive to the syntactic relations between a selector and a selected element. The application of NSR before Spell-Out can be seen from the fact that the ill-formed *[VV+R], *[VRR NP] and *[V-PP NP] can only be ruled out in syntax by NSR.

First, if the ill-formed *[VV+R] is assumed to be ruled out in the lexicon not in syntax, one must also assume that all [V+R] forms are formed in the lexicon and not in syntax. The problems with this hypothesis, however, are two fold. On the one hand, if the *[VV+R] forms were created in the lexicon, there will be no way to rule them out by NSR, because NSR is a phrasal rule and does not apply to compounds. If, on the other hand, some other lexical stress rules, such as Non-Head Stress (Duanmu 2000), could rule out the *[VV+R], the same rule must allow the [V+RR] to be grammatical. The problem then is this: when [V+RR] is allowed in the lexicon, there is no way to explain in syntax the prohibition against [V+RR] taking post-verbal objects. Because if [V+RR] forms are formed in the lexicon, there will be no reason, even prosodically, to distinguish the VRR (trisyllabic) from the VR (disyllabic) in syntax, because both are (compound) verbs selecting an object, and the NSR (or the NHS?) will apply to them equally well, unless two separate rules are stipulated, by which the *[VV+R] is ruled out in the lexicon and the *[VRR NP] in syntax. Even so, the [V+RR] must be considered as formed in syntax, otherwise *[V RR NP] still cannot be ruled out by prosody. Note further that, the Nonhead Stress proposed in Duanmu (2002) will fail to distinguish the VRR from the VR because both can be nonhead-stressed, and the NP in [V+RR NP] will also be a non-head, hence stressed, and the sentence should be grammatical, contrary to the fact. It follows that the [V+RR] forms must not be formed in the lexicon. If both [VVR] and [VRR] must be formed in syntax and the ill-formed *[VVR] and *[VRR NP] must be ruled out by NSR, it is evident that the NSR must apply in syntax.
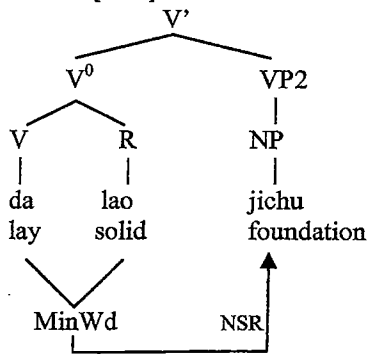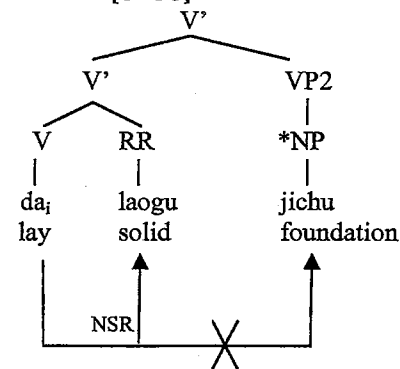
Given the above evidence for the application of NSR in syntax, we can now examine the P(rosodic)-Effect caused by the NSR. Let us look at the [VRR NP] structure first.

19.

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                              VP
            NP                        v'
                          v1                    VP2
                   V      R       NP                 V'
                   da_i   lao_j   jichu_k
                   lay    solid   foundation  V2              VP3
                                            /    \          NP        V
                                           t_i   t_j        |         |
                                                           pro_k      t_j
```

As argued in Feng (2002), the verb+resultative construction are generated in the structure given in (19). In other words, the VR forms are syntactic compounds formed by head-movement. What is most important here is the P-Effect that *da lao* 'lay solid' can take an object while *da laogu* 'lay solid' cannot, which can be captured perfectly by the application of NSR in structure (19), as illustrated as follows (all traces are invisible to the application of NSR[3] and only relevant part of the tree structure (19) is repeated here).

20   a. $[\sigma+\sigma]=X^0$ b. $[\sigma+\sigma\sigma]=X'$

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            V'                                          V'
      V^0          VP2                           V'            VP2
    V     R         NP                        V    RR          *NP
    |     |         |                         |    |            |
    da    lao      jichu                      da_i laogu       jichu
    lay   solid    foundation                 lay  solid       foundation

        MinWd      NSR                             NSR
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[3]. The Invisibility Condition along with the Structural Removing Condition (taken from Feng 2003) are given below:

Invisibility Condition

In Chinese, anaphoric elements are prosodically invisible constituents that have no bearing on prosodic analysis.

Structural Removing Condition (SRC)

Remove all the prosodically invisible elements (with their syntactic branches) from the tree structure, when NSR applies.

Given the head-movement structure (19) and the MinWd Condition (footnote 2),[4] it is expected that this type of syntactic movement cannot be successful unless the moved category is a minimal word.

The application of NSR in syntax can also be seen from the P-syntax of [[VO] NP] structure (13b). The syntactic operation that derives (13a) is given in (21) (Feng 2002) and the ungrammatical (13b') is captured by the application of NSR in (22) (all traces are invisible to the application of NSR and only the relevant part of the tree structure (21) is repeated in (22)).

21.

22   a. $[\sigma+\sigma]=X^0$ b. $[\sigma+\sigma\sigma]=X'$

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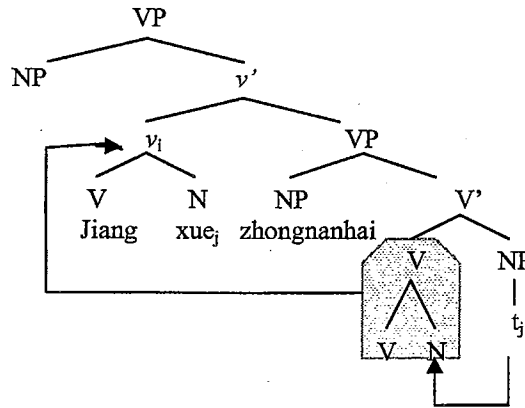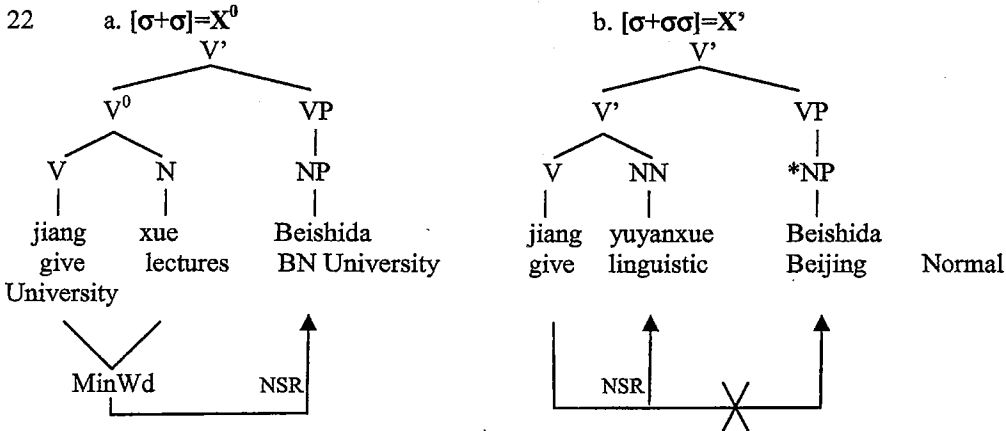
[4] This implies that MinWd Condition must apply in syntax. A technique problem is this: how can syntax access to MinWd Condition (defined in terms of number of syllables). One possible way, I would like to suggest here, is that every root morpheme in the lexicon can be marked with either a N (=a monosyllabic noun), an A (=a monosyllabic adjective), or V (=monoysllabic verb)..etc. Since in Chinese every (native) syllable is a morpheme (even if not every morpheme is a syllable), every word (including compounds) can be marked with either N(N), V(V), A(A)...etc in the lexicon, thus, *zhengqi* is marked with zhengqi(AA) and qi(A), baifang(VV) and fang(V). The MinWd condition can be formulated as follows:
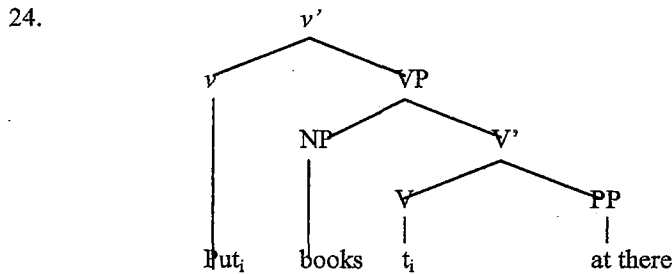
Minimal-Category condition:

A minimal category (X^0) must be formed by no more than two standard symbols in a tree.
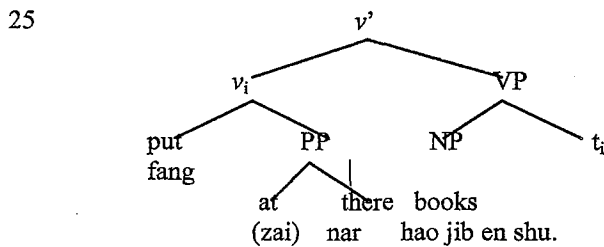
Obviously, the ungrammaticality of *[VRR NP] and *[VOO NP] is the same in terms of P-syntax. Actually, the P-Effect of NSR is not only manifested in structures involving an outer object as seen above, but also PP as seen below (taken from Feng 2003).

23.   a.   Ta fang (zai) nar   le   yi ben shu.
             he put   on   there Asp. one CL. Book
             'He put a book there.'

       b.*Ta fang zai hao ji   zhang zhuozi shang le   hen   duo   ben shu.
          he put at good many CL. table   top Asp. very many CL. Book
          'He put many books on many tables.'
       c.   Ta fang le yi ben shu zai zhouzi shang.
             he put Asp one CL. book at table top.
             'He put a book on a table.'

How does the NSR work syntactically when the locative NP is prosodically invisible as in (23a)? According to Larson's double object structure (1988) which Huang (1988/1994) has adopted for Chinese, the [V PP NP] is assigned to the following structure:

24.

```
                    v'
        _____/ _____
       v                       VP
       |              _____/ _____
       |            NP                 V'
       |             |          ____/  \____
       |             |         V            PP
       |             |         |            |
     Put_i         books      t_i         at there
```
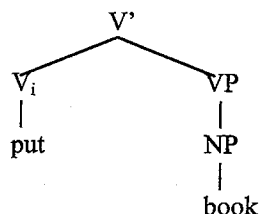
Furthermore, following Larson's (1988) reanalysis of the lower V' as V when it moves into the empty V, the [V PP NP] sentences (23a) can therefore be derived as follows:

25

```
                     v'
          _____/ _____
        v_i                    VP
      __/ \__            ___/  \___
    put    PP          NP         t_i
    fang  /\  |
        at there books
      (zai)  nar   hao jib en shu.
```
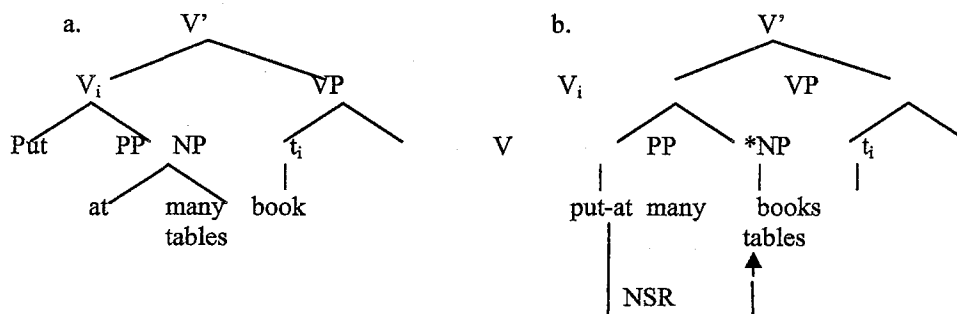
The V' category *put at there* moves together to the V (the aspect marker *-le* in (23a) is an evidence for this process), giving rise to the [V PP NP] sentences. Note that this process can yield a desirable result if and only if the PP is prosodically invisible to NSR, because only then what the NSR actually sees in structure (25) can be a sister relation between the verb (governor) and the object (governee), the same process observed in (20) and (22).

26.

```
              V'
          ╱        ╲
       Vᵢ            VP
        |             |
       put           NP
                      |
                     book
```

By removing all the invisible constituents (or branches) from the tree, according to the SRC given in footnote (3), the NSR-visible structure is the one given in (26). It is not difficult to see that if the PP is not invisible to NSR (23b), we cannot have a structure like (26) and the object *book* will not be a legitimate target of NS, and a sentence so generated will be ungrammatical (23b), as shown in (27).

27   a.

```
                V'
           ╱         ╲
        Vᵢ             VP
       ╱  ╲           ╱  ╲
     Put   PP   NP   tᵢ
          ╱  ╲   |
        at  many book
            tables
```

b.

```
                    V'
               ╱          ╲
          Vᵢ                VP
         ╱   ╲             ╱  ╲
    V   PP    *NP         tᵢ
         |      |          |
     put-at many  books
            tables
```

Since '*many tables*' is a visible NP, the verb can actually see it, and then assign NS to it. This will leave the object NP *books* uninterpretable, exactly like the NP in [[V-RR] *NP] and [[V-NN] *NP]. This is why even if any PP can be moved together with the V in syntax, only the prosodic invisible ones give the right result.

Note further that the [V [PP]] movement to the empty verb (25) is a syntactic operation but it is prosodically constrained by NSR. Given this, it follows that NSR must apply in syntax for otherwise there is no way to rule out the movement of [V [PP]] in (26) when the PP is prosodically visible. In other words, what must be ruled out by NSR in (23) is a syntactic movement, not a lexical entity. Thus, NSR must apply to syntax simply because there is no syntactic operation after Spell-Out.

6. Conclusion

Given all the facts discussed above, it is clear that the grammaticality of *[[V-NN] NP], *[[V-RR] NP] and *[[V-PP] NP] is the same in terms of inoperable NSR in these structures (i.e., the NS cannot be assigned to the NP hence the sentence so produced is ineffable). Thus, prosody not only blocks legitimate syntactic structures but also activates potential syntactic operations. The former can be seen from the ungrammatical sentences that are prosodically ill-formed though syntactically legitimate. The latter can be seen from examples given in (23). The [[V [P NP] NP]] structure is clearly conditioned on whether the locative NP is a pronoun or not (23a-b). This contrast shows that the movement of [V PP] onto the empty v position in (25) is operated strictly under a prosodic condition; it is obviously a prosodically activated syntactic movement in the sense that legitimate syntactic operations are operable only if it is allowed prosody.

If there are prosodically blocked syntactic structures and prosodically activated syntactic operations, the hypothesis given in Pullum and Zwicky (1988) must be not be correct:

> "Syntax-phonology interface is asymmetrical; certain specific types of syntactic information are available to phonology but no phonological information is available to syntax."

Similarly, the strict autonomy of syntax proposed in Chomsky (1965) may also be reconsidered. If syntax is strictly autonomous, it cannot be sensitive to information stated in the vocabularies of other modules (Kager and Zonneveld 1999). However, as is well known, prosody does affect morphology and morphology can be part of syntax, at least in some theoretical frameworks (cf. distributed morphology and lexical syntax). If so, it will contradict the strict autonomy hypothesis. As seen above, prosody does constrain syntax. Thus, if we assume that syntax has access to prosody, then, not only can the contradiction be resolved, more desirable consequences can be derived as well ----- Prosody not only affects morphology in Prosodic Morphology (P » M) but also syntax in Prosodic Syntax (P » S).

Overall, this study shows that Chinese language can provide crucial evidence for the theory of P-syntax, based on which further questions can be asked: (1) If Chinese language is deeply affected by prosody, what are the consequences of this effect in all aspects of that language and (2) if syntax could have access to prosody, what are the effects in other languages? -------- all important questions for future studies.

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